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What Can the Application Blank Tell? Evaluation of Items in Personal History Records of Four Thousand Life Insurance Salesmen
—*Grace E. Manson*

Selection of Motormen. Part I. Survey of the Literature
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Book Reviews Abstracts News Notes

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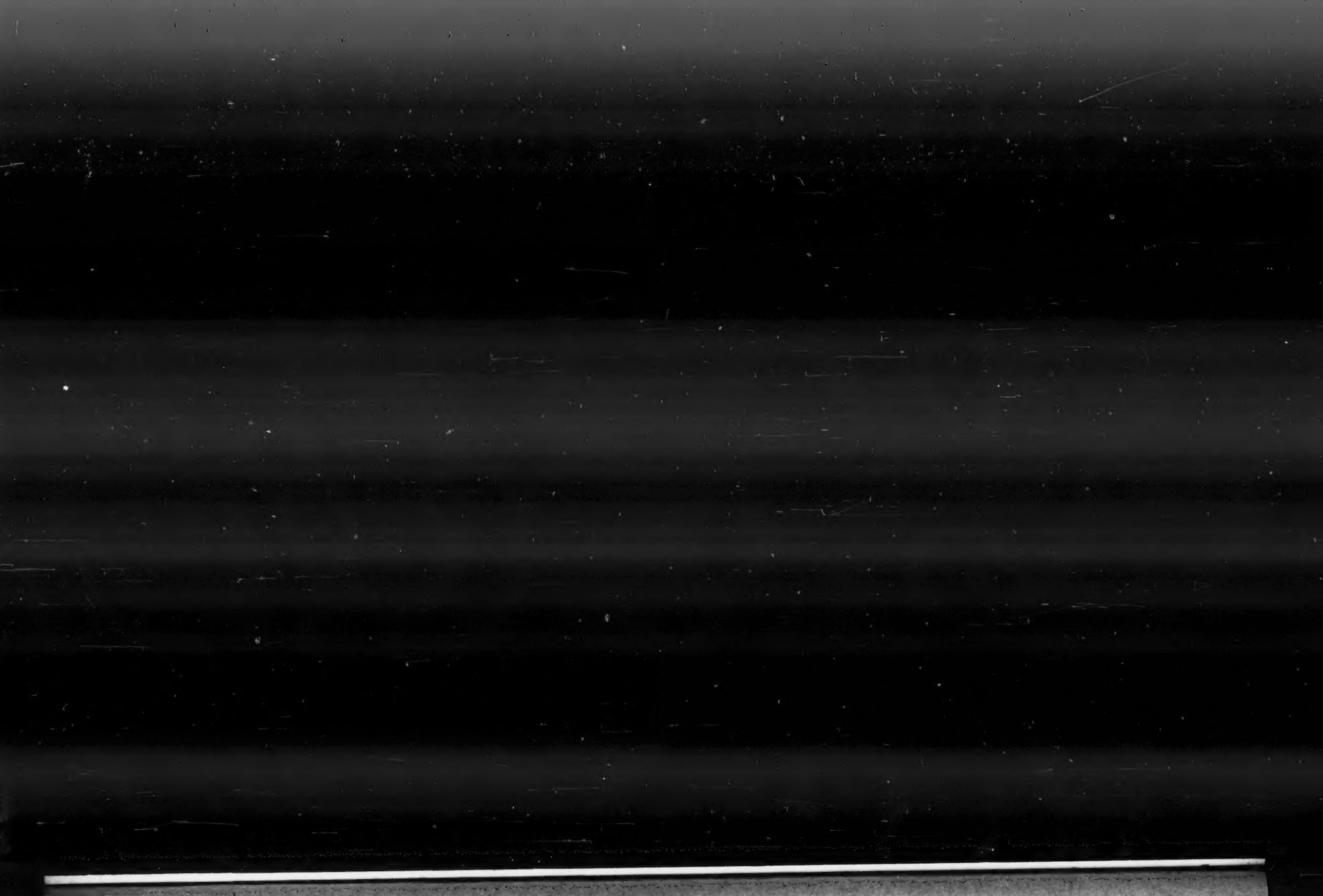

What Can the Application Blank Tell?

Evaluation of Items in Personal History Records of Four Thousand Life Insurance Salesmen

By Grace E. Manson, *University of Michigan*

The prediction of sales ability, a practical problem, has intrigued many busy executives and a few patient scientists. Everyone knows that the application blank cannot tell very much; but the modicum of information it yields—rightly weighted in conjunction with other data about a group of applicants—may be decisive in selection. It is important alike to applicant and to employer. Dr. Manson used the tools of statistical method to measure the significance of items on the personal history blank and to combine these measures into an index of selling ability. In this article she summarizes the findings of a voluminous and painstaking study.

I. The Problem

Need for an Appraisal of the Application Blank

THE application blank, with its queries as to age, experience, education, etc., is used so universally that it seems but common sense to inquire into the value of the information gained from it. Both employers and employees tacitly assume that this information, which is largely of a biographical nature, is of value. Quite striking evidence of the generality of this assumption can be found by glancing at the "Help Wanted" or "Situations Wanted" columns in any newspaper. Employers state that they desire men of certain age, education, and experience. Men wanting positions, feeling that they have the desirable biographical assets, state that they are of a certain age, have had so many years of experience, and are married.

Similar questions are asked and answered at the time the applicant is interviewed. Here, of course, the situation is quite different, as the interviewer has the opportunity to judge the man by other criteria than the actual replies given to these biographical questions. Secondary criteria are likewise present when reading an application blank; the form and clearness of the answers, the handwriting, the neatness of the form; all have their influence.

We realize the necessity of narrowing such a complex problem. Therefore, we have limited ourselves to the task of ascertaining of what value it is to know certain personal history facts when considering an applicant who wishes to become a life insurance salesman.

The application, or personal history blank is a brief summary of the applicant's previous and present life. Does the information on these blanks serve as an index to the selling ability of the applicant? It is easy to speculate. Our task is that of ascertaining by exact statistical procedure, what relationship exists between each of the several items on the personal history records and sales production; also between a weighted combination of the personal history items and production.

PREVIOUS INVESTIGATIONS

Research work on this problem is not without precedent in the field of life insurance selling. Within the last few years, several life insurance companies have, by making studies of the application blanks available in their home offices, evolved scoring methods which have materially assisted them in their selection programs. Noteworthy among these are the work of the Sales Research Division of the Phoenix Mutual Life Insurance Company (1), the study made by Miss Dorothy Goldsmith of the Guardian Life Insurance Company (2), the report of H. A. Richmond of the Equitable Life Assurance Society (3), the several investigations of the Metropolitan Life Insurance Company (4), and the studies of Mr. Philip Burnet (5) and Miss Casey (6) of the Continental Life Insurance Company of Wilmington, Delaware.

Although arrived at by different methods, there is considerable agreement among these investigators on some items. In general, from 30 to 40 is the favored age at contract; to be married is better than to be single; to have dependents is better than to have none. It is better for an applicant to carry life insurance than not. It is well to belong to several clubs.

There is less agreement in the matter of education and previous business experience.

SUMMARY OF PRESENT STUDY

The present investigation includes data from 4178 agents of eighteen life insurance companies of varying size, doing business in widely scattered sections of the country. The problem thus became that of determining the personal history qualifications necessary for selling life insurance for any company rather than the qualifications necessary for a specific company. We have assumed that a man having the qualifications necessary for the vocation will be successful in any company, provided that conditions within the company or within the agency are normal.

The results of this study show that there is not a very close relationship between any one of the biographical items found on the Agent's Experience Record and subsequent success in selling life insurance. Those items which bear the closest relationship are: amount of insurance carried at contract, number of present club affiliations, and number of years of experience in selling life insurance. The two latter items are dependent upon information which is not available at the time the applicant is applying for a contract. The two specific items which have the most reliable predictive value

are: (*a*) it is favorable to have three or more dependents at time of contract; and (*b*) it is favorable to carry $15,000 or more life insurance at time of contract. If the standard requirement for reliability is lessened so that differences are considered reliable if the difference equals twice the standard error of the difference, then it is favorable (*c*) to be between the ages of 36 and 39 inclusive, at time of contract, (*d*) to have had 2, 3 or 4 previous jobs, and (*e*) to carry $5000 or more life insurance at time of contract.

When several personal history items are considered, and each of these is given a proper weighting, the multiple coefficients of correlation with success in selling range around 0.40.

When the personal history records of a group of agents having approximately the same length of experience with their companies, are scored by several methods, the coefficients of correlation between the total score and production range from 0.15 to 0.41.

These correlations show that the information contained on the personal history record has some predictive value, but that its accuracy in prediction is not sufficiently reliable to justify its use as the principal measure of future success in selling life insurance. On the other hand, multiple correlations ranging around 0.40 do indicate that the weighted personal history record has sufficient prognostic value to warrant its inclusion in all selection programs.

Our results also show that certain tendencies toward relationship exist, which, while they do not bear the tests of reliability, are at least evidence of some existing relationship between certain personal history items and production. In the following sections, each personal history item has been discussed in relation to production and other biographical items. These less reliable tendencies have been pointed out along with the more reliable tendencies, but always with the reservation that the existing relationship may be due in part either to chance or to especially favorable experience or conditions of work.

II. MATERIAL AND PROCEDURE

SUBJECTS

This study was made possible by the coöperation of the company members of the Life Insurance Sales Research Bureau. The agents of seventeen of these companies aided by answering the inquiry which was sent out by the Life Insurance Section of the Bureau of Personnel Research. Another company placed its home office personal history files at our disposal. Three thousand six hundred and seventy-five agents answered the questionnaire. The personal history records of 503 agents were obtained from the company files.

AGENT'S EXPERIENCE RECORD

Since the home office records of the seventeen coöperating companies included a variety of personal history items, it seemed necessary for the sake of uniformity, to send out a standard application blank. The personal history blank used is a modification of the Bureau of Personnel Research form and the later Life Insurance Sales Research Bureau Experience Record

Form 1-1 2M-5-22. The items included are those upon which the company representatives, in specially called conference, agreed that the most desirable information could be gained.

Since the blanks would be answered by agents who had been with their respective companies for varying lengths of time, it was necessary to divide the Agent's Experience Record into two parts, the first part including

Copyright 1922
Life Insurance Sales Research Bureau
Form 1-70 5000-3-22

Waco, Tex. Agency

Texas Life Company Date April 7 1922

AGENT'S EXPERIENCE RECORD

Please give some answer to every question below. Where there is a choice, put a cross in the square (☐) that applies to you. This information from many agents will be combined for the general use of the company.

1. Name Smith (Last) John (First) (Middle) 2. Full time ☒ Part time ☐
3. Date of birth 1876 4. Are you Single ☐ Married ☒ Widowed ☐ Divorced ☐ or Separated ☐ ?
5. Height 5 feet 8 inches. 6. How many dependents do you have? Children 2 Adults 2
7. Schooling: Draw a circle around the last grade or year in school which you completed:
Grades: 1 2 3 4 5 6 7 8 High School: 1 2 3 4 College: 1 (2) 3 4. Quit school what year ? 1895
How many months have you had of night school and correspondence school? None
8. State each position held since you first started to work; begin with your first one and list them in order.

	Year		Year	Kind of position	Employer
1	1895	to	1900	Stock farming	Self
2	1900	to	1910	Grocery Salesman	Harris and Baker
3	1910	to	1914	Rackets and light Rdws.	Kane Hdw. Co - self
4	1914	to	1917	General collections + Sec.	Amick Building Assn
5	1917	to	1920	Collections and soliciting	Hartley News Tribune
6	1920	to	1922	Insurance Salesman	Texas Life Insurance
7	____	to	____		
8	____	to	____		
9	____	to	____		
10	____	to	____		

9. Name the social clubs, fraternities, church and business organizations to which you belong, and state what office you have held in each Masons - Baptist - no office
10. What per cent of your 1921 business was sold in towns over 5000? all in and around Waco, Tex.
11. How did you first become interested in the selling of life insurance?
☐ Through a newspaper or magazine advertisement.
☒ Through a friend in the business.
☐ Through circulars of company in which I was insured.
☐ Through _____
12. When did you begin your connections with this company? Feb., 1920.
At that time, were you Single ☐ Married ☒ Widowed ☐ Divorced ☐ or Separated ☐?
How many dependents did you then have? Children 2 Adults 2
Did you begin as full-time ☒ or part-time ☐ agent?
How much life insurance did you then carry? Private Companies $2000 War Risk $_____
How much life insurance do you now carry? Private Companies $5000 War Risk $_____

Please return this blank to your General Agent or Manager as soon as you have filled it out.

FIG. 1

facts as they were at the time, the second, facts as they were at the time that the agent joined the company. Thus "age at entrance" is one of the items in the second part. Certain items such as height and education would be the same for both parts. These were not repeated. An examination of the Agent's Experience Record will make this division clearer (fig. 1).

CRITERION OF SUCCESS

The criterion of success was the amount of insurance paid for in 1921. The amount of business paid for was reported as a total for the year if the agent had joined the company previous to January 1, 1920. If he had entered the company during this two year interval, the amount of insurance he had sold was given month by month. In these latter cases, if the agent had entered the company previous to July 1, we divided his total production in that year by the number of months he had been with the company during that year, and multiplied by twelve. If he had entered after July 1, we called the next year's production his first year's production.

The 1920 and 1921 production records were filled out on the Production Record slips (fig. 2) by clerks in the company's home office and were clipped to the proper personal history blank previously filled out by the agent himself. Both records were then returned to us.

The amount of insurance paid for in 1921 was the criterion used. It would have been better to have used production in 1920 also, but time would not permit the use of both years' figures and more cases could be included by using 1921 production as the criterion. The correlation between the amount of business paid for in 1920 and 1921 (full-time agents) was $r = 0.69$. When amount of experience (years with the present company) was held constant by partial correlation formulae, the correlation coefficient of 0.69 remained

PRODUCTION RECORD
(PAID BASIS)

Name Smith, John

Date of First Contract January 2, 1920.

Date of Present Contract

If agent was appointed in 1920 or 1921, please give production by months if possible. For others, give only the yearly total for each year. Give paid business if possible, otherwise paid premiums.

1920			1921		
Month	Paid Business	Paid Premiums	Month	Paid Business	Paid Premiums
Jan.	15448		Jan.	6000	
Feb.	8000		Feb.	9850	
March	17833		March	7235	
April	27375		April	2250	
May	21000		May	3000	
June	10000		June	19750	
July	45500		July	6500	
Aug.	6000		Aug.	5000	
Sept.	13250		Sept.	18417	
Oct.	27000		Oct.	7000	
Nov.	10500		Nov.	3000	
Dec.	2500		Dec.	11250	
TOTAL	198,406		TOTAL	98652	

FIG. 2

the same. Therefore, it seemed safe to conclude that agents had about the same relative standings in production in 1920 as in 1921, and that experience was showing about the same influence. Whether the other personal history items were having the same influence as in 1921 we can only assume.

METHOD OF HANDLING THE RECORDS

The material in hand was so extensive that it had to be handled by Hollerith tabulating machines as much as possible, for the sake of accuracy as well as speed. It therefore became necessary to prepare a code by means of which all informational items could be translated into code numbers. The codes for the Agent's Experience Record and the single company material are similar, the former being the more inclusive. A sample

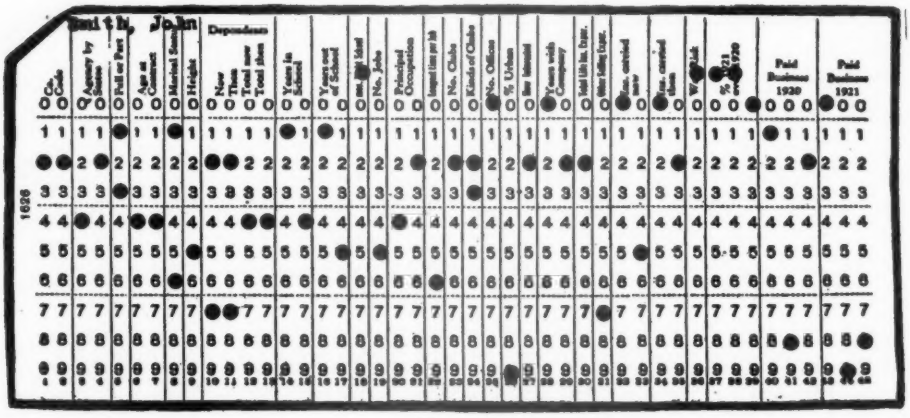

FIG. 3

Hollerith card (fig. 3) may be of interest to persons doing work which requires the handling of many records. This card has been punched so that the holes indicate in code the data contained on the Agent's Experience Record and Production Record, figures 1 and 2.

CONTROL GROUPS

The material gained from the personal history records gives us a cross section of the life insurance selling force. We know how much insurance these agents sold in 1920 and 1921, we also have certain other information of a biographical nature. But very early in the course of our study, it became evident that factors were influencing the amount of insurance sold in 1921, other than the biographical factors under consideration. These other factors which we have called "conditions of work" have to do (*a*) with the amount of time the agent gives to selling insurance, (*b*) with the length of time the agent has been with the present company, (*c*) with the population of the territory where he sells the bulk of his business, and (*d*) with the company for whom the agent is selling policies. We therefore formed six control groups in which one or another of these "conditions of work" factors was held constant. These groups are designated as:

Group I. This group is divided into two parts, full-time agents and part-time agents. The total group consists of 2712 agents, all personal history blanks which had been returned by July 1, 1922. Of this number, 1341 were full-time agents, 1035 part-time agents.

Group II. This is a full-time group only. It is the most carefully selected control group and consists of 186 full-time agents who have been with their respective companies only one year and have sold 70 per cent or more of their business in towns of over 5000 population. To be quite sure that only full-time agents were selected, we included only those records where the agent had checked full-time at contract and at the present time.

Group III. This group includes only the records of agents of one coöperating company. The whole-time and part-time groups are handled separately. We have here aimed to hold constant the influence due to the company for whom the business is sold. The group is made up of 246 full-time agents and 329 part-time agents with production records for 1921.

Group IV. Group IV is divided into full-time and part-time groups. It includes all cases with complete production records at hand January 1, 1923, and serves as a check on Group I. There are in the group 1528 full-time agents and 1167 part-time agents.

Group V. This group differs from the previous ones in that it is composed of the agents from the single company whose records were obtained from the company files, rather than from the Agent's Experience Records. The group includes all agents taken on by this company in 1919; 131 full-time agents, 358 part-time agents.

Group VI. Group VI was chosen on the basis of population of selling territory. In this group are 867 full-time agents who sold 90 per cent or more of their business in towns of over 5000 population.

RELATION OF CONDITIONS OF WORK TO PRODUCTION

Significance of Amount of Time Given to Selling Life Insurance

Our only measure of the amount of time that an agent gave to selling insurance for the company whose blank he answered was whether he signified at the top of the Experience Record that he was a full or part-time agent at time of contract. We did not have any record of the number of hours a day he gave to selling insurance, nor did we know the average number of calls he made each day or each month. The classification is thus a crude one on the basis of whether the agent said he was a full or part-time agent. This designation as full or part-time usually refers to the type of contract that the man holds with the company. However, our interest had to be in the mass rather than in individual cases, and, on the whole, those who called themselves full-time agents, sold so much more business than those who called themselves part-time agents, that it became necessary to handle them as separate groups.

TABLE 1
Production of full and part-time agents

	FULL-TIME	PART-TIME
Median	$107,200	$13,288
Upper quartile	171,200	35,609
Lower quartile	57,830	3,760
Quartile deviation	56,685	15,924

These differences were found by making frequency distributions of the production records of full and part-

time agents in each of the six control groups. The median and average production for each group was found, also the spread as shown by the quartile deviations. For example, see Group IV. (1528 full-time agents—1167 part-time agents.)

Part-time agents produce much less than full-time agents. In this group (IV) the lower quartile of full-time agents shows that 25 per cent of full-time agents sold $57,830 worth of insurance or less; whereas 25 per cent of part-time agents sold less than $3760 worth of insurance. In fact, only 15 per cent of the part-time agents sold more insurance than the poorest 25 per cent of full time agents. The same condition holds for the other control groups.

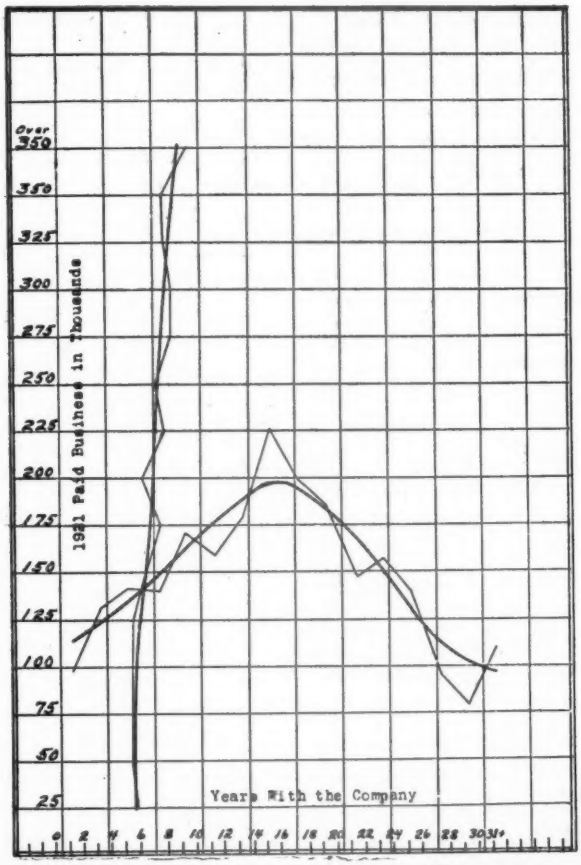

FIG. 4. REGRESSION LINES SHOWING RELATION BETWEEN YEARS WITH THE COMPANY AND 1921 PAID BUSINESS

Original averages and smoothed curves are given for full-time agents, Group IV. 1921 paid business is expressed in thousands of dollars.

Significance of experience

The agent was asked, on the personal history blank, to give the date when he made his first connection with the company. This date was verified by asking the Home Office to give the date of each agent's first contract as it stood on their records. The difference between date of contract and December 31, 1921, was the number of years the salesman had been with the company.

The number of years that the agents had been with the company was then plotted against 1921 production, full-time and part-time groups being handled separately. Figure 4 shows that the average production increases with number of years with the present company up to about fifteen years, and then declines.

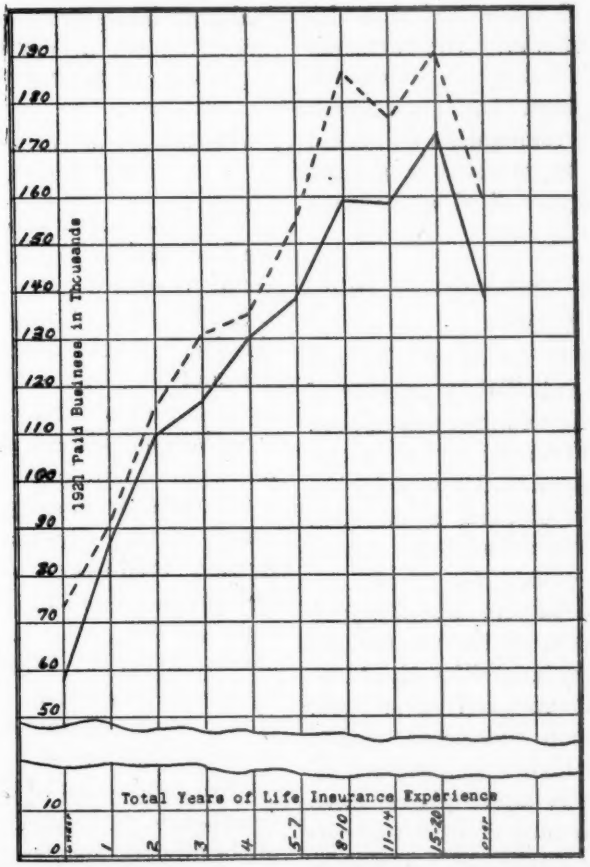

FIG. 5. REGRESSION LINES SHOWING RELATION BETWEEN TOTAL YEARS OF LIFE INSURANCE EXPERIENCE AND 1921 PAID BUSINESS

Dotted lines are for full-time agents, Group VI, solid lines for full-time agents, Group IV.

The same condition is found when the relationship is between sales and total years of life insurance selling experience, which includes experience with the present and other companies. Production increases with experience up to 15 to 20 years, and then decreases. (See fig. 5.) The particular point that this chart emphasizes is that large producers have, as a group, been with their companies a number of years. They represent but a fragment of the agents hired at the same time.

Significance of population of selling territory

Question 10 in the Agent's Experience Record reads "What per cent of your business is sold in towns of 5000 and over?" From the replies to this question, we hoped to discover whether the production of rural agents was materially less than that of city agents. Unfortunately the form of the question, when the percentages happen to be about the same, throws amounts produced in very large cities with those produced in towns barely over 5000.

In each group considered, agents who sell the higher percentages of their business in larger places, have the greater amount of paid for business to their credit. For example, in Group IV (1528 full-time agents) those agents who sold none of their business in towns, had a median production of $78,950. These men are undoubtedly the typical rural agents. The nearest we can come to the typical urban agents are those who sold 90 per cent and over in towns of 5000 and over. The median production of these agents is $118,700.

If we consider all agents producing under 70 per cent of their business in towns of 5000 and over as rural agents, and those producing 70 per cent and over as urban agents, the 987 full-time urban agents in Group IV had a median production of $120,757, the 492 rural agents had a median production of $88,709.

Significance of comany for which business is sold

The final "condition of work" which we have endeavored to control is the company for which the agent is working. The two control groups in which this factor is held constant are Groups III and V. Group III was chosen because we had more personal history records from this company than from any other. Group V is the company whose personal history records were taken from company files. The median production for Group III full-time agents is a little higher than that of the total group, $111,000 against $107,200. This is hardly more than could be expected since Company X is a very well-established one, doing a large volume of business. The median production of Group V is not comparable to the production medians of the other companies since the group includes all persons hired, both good and poor, and also because 1919 production is used as a criterion of success rather than 1921 production.

Summary of significance of conditions of work

In this section we have shown why it was necessary to establish control groups and also the make-up of each

control group. The reason for forming these control groups, which subsequent results in a measure justify, was that the relationship existing between the biographical variables and the criterion could be ascertained with a greater degree of accuracy if other factors, which were acting upon the criterion, could, in some wise, be held constant. The form and incompleteness of the replies made it impossible to do this by partial correlation formulae. Yet, comparison between the median production of full and part-time agents, of recently hired and long tried agents, of rural and urban agents, of agents of large, old established and other companies, shows that these conditions of work play their part in determining who shall be successful life insurance agents. We are quite cognizant of the fact that many other factors, about which we had no information and which we had no means of controlling, were acting upon the criterion. This made it all the more necessary to hold constant as many as possible of these disturbing elements.

Throughout this study, results obtained from Group II are considered the most reliable. This is the group in which three of the conditions of work variables; time given to the work, territory, and experience, are controlled.

III. RESULTS

SIGNIFICANCE OF INDIVIDUAL BIOGRAPHICAL ITEMS

Methodology

In this section we will discuss in turn the significance of individual biographical items. We have gone into more detail concerning some items than others, but our method of approach has been the same throughout. We have considered (*a*) the relation of the biographical item to production, (*b*) the relation of the biographical item to each of several other biographical items.

In measuring the relation of any item of biographical information to production, we have plotted the item under consideration against 1921 production and found some measure of the central tendency of production in each interval of the other factor. Either median or average production served this purpose. When it seemed of sufficient importance, we found both. The next step was to get some measure of the variability of production within each interval of the other factor. For this purpose we used the semi-inter-quartile range which is found by dividing the distance between the upper and lower quartile by two. The third step was to find the correlation existing between the biographical factor and 1921 paid business.

This relationship between individual items and production was further verified by the method of significant differences. By this technique the agents are divided into two groups, successful and unsuccessful, on the basis of production. Then the differences between the per cent of successful and unsuccessful in each interval of the biographical item is found and tested for reliability. The formula used was the one given by Yule, $s = \sqrt{\frac{pq}{n}}$ in which p = per cent of successes, q = per cent of failures, and

n = number of cases under consideration.

To find the relationship existing between the several biographical items, we plotted the item under discussion against each of the other biographical items and found the coefficients of correlation. When we considered it of sufficient importance, we found the median of the other item for each interval of the factor under consideration.

Throughout this section, we have worked with the six control groups, keeping full-time and part-time agents in separate groups. We have not been as thorough in our treatment of the part-time as of the full-time cases. The part-time problem is a study in itself, as success is controlled, in a large measure, by the amount of time given to selling insurance. It seems futile to go into any intensive study of part-time agents without having some measure of the amount of time and effort expended.

The biographical items studied in the manner just described were (*a*) age at contract, (*b*) present age, (*c*) marital status at contract, (*d*) present marital status, (*e*) height, (*f*) number of dependents at contract, (*g*) number of dependents at present time, (*h*) education, (*i*) number of years out of school, (*j*) number of months of night or correspondence school, (*k*) number of previous jobs, (*l*) principal previous occupation, (*m*) longest time in any previous job, (*n*) number of club memberships, (*o*) number of offices held in clubs, (*p*) how they became interested in selling insurance, (*q*) number of years of life insurance experience, (*r*) number of years of other selling experience, (*s*) amount of life insurance carried at contract, (*t*) amount of insurance carried at present time, and (*u*) amount of war risk insurance.

Findings

It is impossible, on account of limited space, to print in full the various voluminous tables of relationship.[1] However, the correlation coefficients will give the reader some idea of the relationship of each of the biographical items to production and to each other. Table 2 gives the correlations between biographical items and production and the intercorrelations between biographical items, for Group II, 186 full-time agents selling 70 per cent or more of their business in towns of over 5000. All members of the group have been with their companies but one year. Table 3 is for Group IV, 1528 full-time agents, table 4 is for Group VI, 867 full-time agents who sold 90 per cent or more of their business in towns of over 5000 population. Agents in Groups IV and VI have been with their companies for varying lengths of time.

In Group II, where date of contract and the date of the filling out of the Agent's Experience Record is within the same year as the production figures, amount of insurance carried,

[1] These tables can be found in the writer's dissertation "The Personal History Record: Relation Between Amount of Insurance Sold and Certain Items in the Previous History of the Salesman," 1923. Typed copies on file at Carnegie Library, Pittsburgh, Pa., and in Personnel Research Federation, 40 West Fortieth Street, New York City.

TABLE 2

Correlations between biographical items and production, and intercorrelations between biographical items

Full-time agents—Group II

	INSURANCE CARRIED THEN	OTHER SELLING EXPERIENCE	TOTAL LIFE INSURANCE EXPERIENCE	YEARS WITH COMPANY	PER CENT URBAN	NUMBER OF CLUBS	NUMBER OF OFFICES IN CLUBS	NUMBER OF JOBS	YEARS IN SCHOOL	NUMBER OF DEPENDENTS THEN	HEIGHT	MARITAL STATUS	AGE AT CONTRACT
Production 1921	0.33	0.08	0.13			0.23	0.08	0.17	0.11	0.20		0.16	0.15
Age at contract	0.39	0.05	0.31			−0.08	0.12	0.40	−0.23	0.46		0.55	
Marital status	0.42	0.34	0.22			0.16	0.24	0.28	−0.08	0.71			
Height													
Number of dependents then	0.39	0.26	0.23	Constant	Constant	−0.10	0.07	0.25	−0.45				
Years in school	0.04	0.31	−0.22			−0.15	0.04	−0.06					
Number of jobs	0.22	0.00	0.17			0.07	0.19						
Number of offices in clubs	0.13	−0.11	−0.12			0.43							
Number of clubs	0.09	−0.22	−0.13										
Per cent urban													
Years with company													
Total life insurance experience	0.098	0.01											
Other selling experience	0.18												

TABLE 3

Correlations between biographical items and production, and intercorrelations between biographical items

Full-time agents—Group IV

	INSURANCE CARRIED THEN	OTHER SELLING EXPERIENCE	TOTAL LIFE INSURANCE EXPERIENCE	YEARS WITH COMPANY	PER CENT URBAN	NUMBER OF CLUBS	LONGEST TIME PER JOB	NUMBER OF JOBS	YEARS IN SCHOOL	NUMBER OF DEPENDENTS THEN	HEIGHT	MARITAL STATUS	AGE AT CONTRACT
Production 1921	0.13	0.04	0.24	0.17	0.13	0.14	0.01	−0.04	0.03	0.02	0.05	−0.01	−0.08
Age at contract	0.26	0.33	0.11	−0.04	0.01	−0.05	0.63	0.31	−0.18	0.38	0.01	0.51	
Marital status	0.25	0.26	0.05	−0.02	−0.51	−0.11	0.40	0.26	−0.10	0.56	0.04		
Height	0.07	−0.02	−0.01	−0.01	−0.02	−0.07	−0.04	−0.01	0.07	0.002			
Number of dependents then	0.22	0.18	0.08	0.04	−0.14	−0.03	0.35	0.16	−0.17				
Years in school	0.09	−0.20	−0.11	−0.02	0.12	0.19	−0.26	−0.22					
Number of jobs	−0.05	0.28	−0.02	−0.13	0.02	0.01	0.03						
Longest time per job	0.25	0.24	0.09	0.08	−0.07	−0.03							
Number of clubs	0.12	−0.04	0.02	0.06	0.14								
Per cent urban	0.09	−0.18	0.03	0.03									
Years with company	−0.09	0.02	0.68										
Total life insurance experience	−0.01	0.03											
Other selling experience	0.09												

TABLE 4

Correlations between biographical items and production, and intercorrelations between biographical items

Full-time agents—Group VI

	INSURANCE CARRIED THEN	OTHER SELLING EXPERIENCE	TOTAL LIFE INSURANCE EXPERIENCE	YEARS WITH COMPANY	PER CENT URBAN	NUMBER OF CLUBS	LONGEST TIME PER JOB	NUMBER OF JOBS	YEARS IN SCHOOL	NUMBER OF DEPENDENTS THEN	HEIGHT	MARITAL STATUS	AGE AT CONTRACT
Production 1921	0.18	0.02	0.28	0.18		0.11	0.05	0.07	0.02	0.08	0.08	0.01	−0.06
Age at contract	0.32	0.31	0.08	−0.09		−0.03	0.62	0.37	−0.18	0.42	−0.06	0.52	
Marital status	0.31	0.27	0.05	−0.06		−0.05	0.44	0.34	−0.10	0.66	0.05		
Height	0.06	−0.01	0.00	0.02		0.01	−0.09	−0.03	0.13	0.05			
Number of dependents then	0.27	0.21	0.06	−0.01		−0.19	0.35	0.20	−0.13				
Years in school	0.04	−0.16	−0.10	−0.06	Constant	0.13	−0.24	−0.25					
Number of jobs	−0.00	0.31	−0.00	−0.10		0.04	0.15						
Longest time per job	0.31	0.25	0.08	−0.01		−0.03							
Number of clubs	0.15	−0.05	0.07	0.09									
Per cent urban	Constant												
Years with company	−0.08	0.01	0.78										
Total life insurance experience	−0.01	0.02											
Other selling experience	0.10												

number of clubs, number of dependents, and number of previous jobs have the highest correlations with production.

In Groups IV and VI, where the time intervals vary between year of contract and 1921 production, the items having the highest correlations with production, are total life insurance experience, years with the present company, insurance carried at contract, and number of club memberships at the present time.

All of the correlations with production are low, the highest being 0.33 in Group II, between amount of insurance carried at contract and production.

The intercorrelations between the several biographical factors are higher than the correlations with production. Detailed examination of the interrelations between these factors sheds much light on the understanding of individual relationships with production. Mr. George O. Swartz (4) of the Metropolitan Life Insurance Company emphasizes this fact in his article, "Selecting Salesmen."

CONCLUSIONS

Significant items

It is impossible to give here the detailed results of each step in the investigation. What conclusive evidence this study offers, lies in the fact that each relationship has been investigated by several measuring techniques and that although the strength of these relationships is weak, results are consistent and in the same direction.

The present study shows that there is not a very close relationship existing between any one of the biographical items found on the Agent's Experience Record and subsequent success in selling life insurance. Those items which are the most predictive of success are:

1. Amount of life insurance carried at contract.
2. Number of present club affiliations.
3. Number of years of experience in selling life insurance.

The specific items which have the most reliable predictive value are:

1. It is favorable to have three or more dependents at time of contract.
2. It is favorable to carry $15,000 or more life insurance at time of contract.

If the standard requirement for reliability is lessened so that differences are considered reliable if the difference equals twice the standard error of the difference, then:

1. It is favorable to be between the ages of 36 and 39 inclusive at time of contract.
2. It is favorable to have had two, three or four previous jobs.
3. It is favorable to carry $5000 or more life insurance at time of contract.
4. It is unfavorable not to belong to any clubs or to belong to only one.
5. It is unfavorable to carry less than $5000 insurance at time of contract.

Less reliable indices

Our results also show that certain tendencies toward success exist, which, while they do not bear the tests of reliability, are at least evidences of some existing relationship between certain personal history items and production. These tendencies are

pointed out in the following paragraphs but always with the reservation that the existing relationship may be due in part either to chance or to especially favorable experience or conditions of work. These results are for full-time agents only.

1. Age at contract: Applicants between the ages of thirty and forty-five are the more desirable because they are likely to produce more business and to remain longer with the company than either younger or older men. However, with careful selection and training, good material can be obtained from the younger applicants for contracts.

2. Present age: Agents who are at present between the ages of thirty-five and fifty are the best producers. As the median amount of experience with the present company is approximately five years, this would make the age at contract of agents now between thirty-five and fifty to have been between thirty and forty-five. This verifies our previous conclusion that from thirty to forty-five are the optimal limits of age at contract.

3. Marital status at contract: The group of agents who were single at time of contract and the group of agents who were married at time of contract produce, after five years' experience (median experience of the group), approximately the same amount of insurance. The group of single men were about ten years younger at time of contract and had had a somewhat greater amount of education.

4. Present marital status: The men who are at present married are, as a group, selling more insurance than the group of agents who are at present single. However, the greatest improvement has been made by the men who were single at time of contract and have married since joining the company.

5. Height: Insurance salesmen are, on the whole, taller than the usual male adult, if the army figures are typical of the average male American. The median height of our life insurance salesmen was 5 feet 9.5 inches, the median height of the million army recruits was 5 feet 7.5 inches. There seems, however, to be little difference in production with variations in height. The median height of successful and unsuccessful groups remains fairly constant at 5 feet 9.5 inches.

6. Number of dependents at time of contract: There seems to be some tendency for agents having three or more dependents at time of contract to make slightly better agents than those having a fewer number. However, the age of the applicant should be taken into consideration when evaluating the significance of the number of dependents.

7. Number of dependents at present time: The agents who are producing the greatest amount of insurance have several children. There is some tendency for the amount sold to increase as the number of dependents increase. There is also evidence that increasing the number of dependents is more of a spur to production than the number of dependents at time of contract.

8. Number of years in school: The production of agents who have attended or graduated from college is slightly higher than the production of men who have attended or com-

pleted the grade course. The production of agents who have attended or graduated from high school but who have gone no further, is lower than that of either of the aforementioned groups.

The personal history characteristics of agents belonging to the three educational groups also differ considerably. The grade school men are oldest at time of contract, have more dependents, and more previous experience in selling insurance and other commodities. The high school men stand next in order in the amount of these personal history qualities. The college man is youngest at time of contract, has fewer dependents and fewer years of previous selling experience. The only characteristic that is reversed is the number of club affiliations. Here the college men exceed, the high school men come next, while the grade school men have the fewest number of club affiliations.

9. Number of years out of school: Results on the surface show little difference in production between agents who have joined the company after an increasing number of years out of school. The existing differences favor agents who have been out of school long enough to have acquired some experience in other positions. Applicants should not have been out of school long enough to have passed the favorable age limits.

10. Number of months of night school: The crude data were so unreliable that the results are of little value.

11. Number of previous jobs: The number of jobs an applicant has had is not a very certain index of his subsequent success in selling life insurance. The age of the applicant, his marital status, his education, as well as the circumstances of change in positions should all be taken into consideration when discussing the number of previous jobs.

12. Principal previous occupation: Men who have had previous selling experience tend to be the most desirable applicants, especially those with insurance or outside selling experience. Men coming from social, are, as a whole, superior to men coming from non-social occupations.

13. Longest time on any previous job: Age of the applicant should be taken into consideration when discussing the length of time spent in other positions. As a general rule the most successful agents are those who have been able to hold some position for several years but who have not remained with one employer long enough to lose adaptability.

14. Present club affiliations: There is a decided tendency for the better agents to belong to more clubs than the poor producers. (See fig. 6.)

15. Number of offices in clubs: There was not any consistent tendency for production to increase as the number of offices held in clubs increased, nor was there any particular number of offices that was outstandingly favorable.

16. Number of different kinds of clubs: There is some reason to believe that the number of different kinds of clubs is a better measure of subsequent success in selling life insurance than the number of club memberships. There is a tendency for production to

increase as the number of different kinds of clubs increases.

17. Sources of interest in entering the vocation: The greatest number of agents said that they became interested in selling insurance through the influence of a friend who was in the business. These agents did not sell as much insurance in 1921 as agents who had derived their interest in selling insurance through other channels.

18. Previous life insurance experience: There seems to be sufficient difference between the production of those agents who have had insurance experience and those who have never sold insurance before joining the present company, to warrant favoring the experienced applicant.

19. Previous other selling experience: On the whole, a man with previous selling experience, particularly outside selling, makes a more successful life

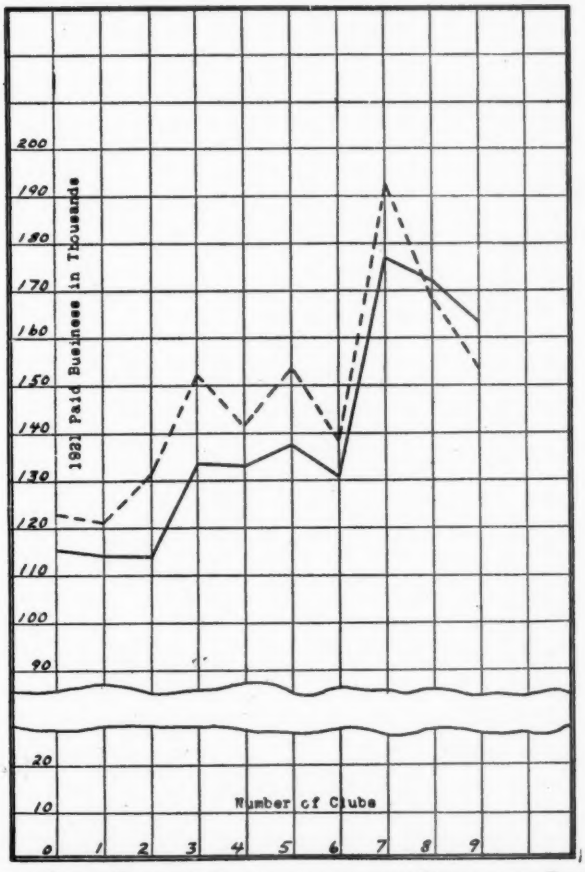

FIG. 6. REGRESSION LINES SHOWING RELATION BETWEEN NUMBER OF CLUB MEMBERSHIPS AND 1921 PAID BUSINESS

Dotted lines are for full-time agents, Group VI, solid lines for full-time agents, Group IV.

insurance salesman than a man who has not had selling experience. The age and education of the applicant should be considered.

20. Amount of life insurance carried at contract: In general, we would agree with previous investigators in saying that applicants carrying insurance, especially those carrying over $5000, are more apt to be successful salesmen than applicants carrying smaller amounts. (See fig. 7.)

21. Amount of insurance carried at the present time: There is a decided tendency for production to increase as the amount of insurance carried by agents now on the selling force increases; that is, successful agents are carrying larger amounts, unsuccessful agents, smaller amounts of insurance.

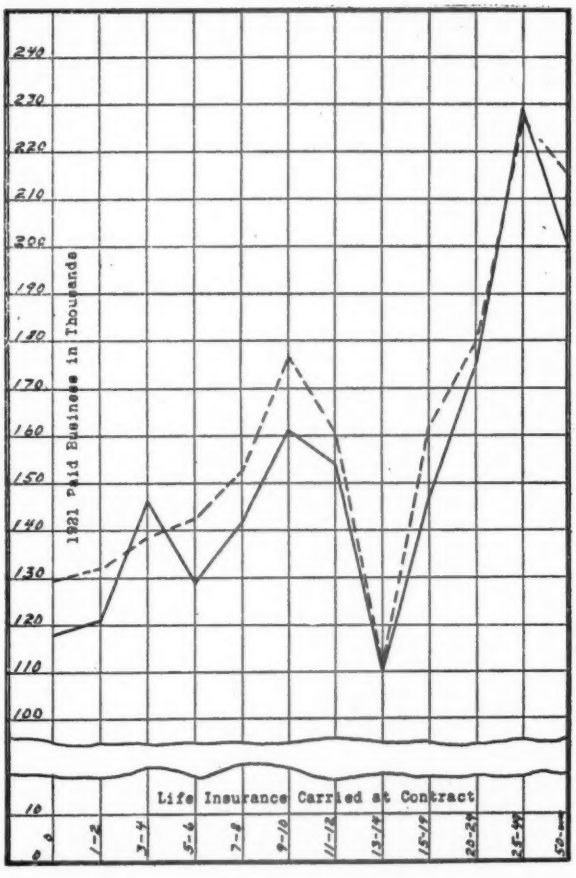

FIG. 7. REGRESSION LINES SHOWING RELATION BETWEEN AMOUNT OF LIFE INSURANCE CARRIED AT CONTRACT AND 1921 PAID BUSINESS

Dotted lines are for full-time agents, Group VI, solid lines are for full-time agents, Group IV.

22. War risk insurance: The number of agents carrying war risk insurance was not sufficiently great to justify a study of the cases.

SIGNIFICANCE OF COMPOSITES OF BIOGRAPHICAL ITEMS

Purpose

In this section it is our purpose to determine if a more significant measure of the predictive value of personal history items can be obtained by combining two or more of the biographical items. It may be that the presence of a small amount of one factor may be amply compensated for by a large amount of another factor. There are many such compensations in physical nature, perhaps we shall likewise find psychical compensations.

Methods

We have attacked this problem in two ways. First, we followed the procedure used by Dr. Ream (8), that is, plotted three-fold scatter tables and by using the formula for standard error of the difference, tested the reliability of the relationship between any given combination of two personal history items and production. This method is illustrated by figure 8.

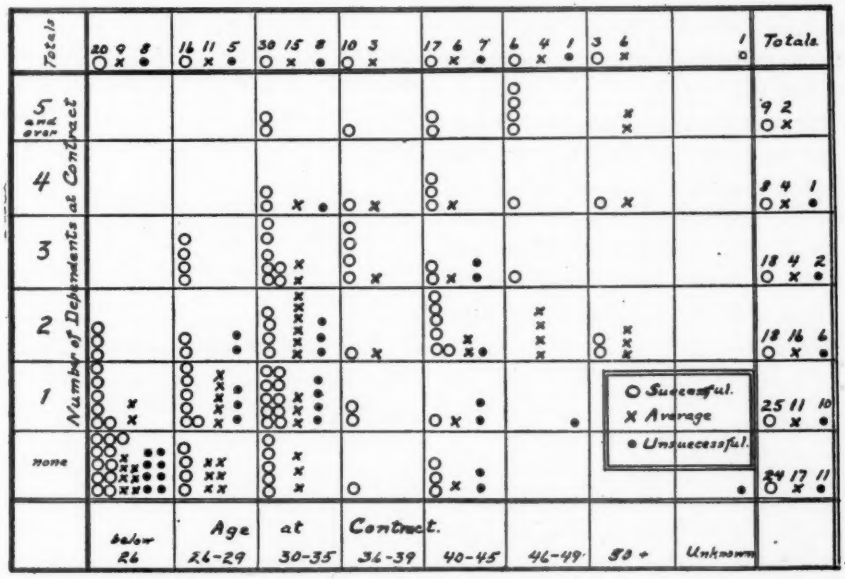

FIG. 8. SCATTER DIAGRAM SHOWING RELATION BETWEEN AGE AT CONTRACT, NUMBER OF DEPENDENTS, AND 1921 PAID BUSINESS

Agents having paid production of $75,000 and above are considered successful; between $25,000 and $75,000, average; below $25,000, unsuccessful. Full-time agents Group II.

The second method of attack was that of multiple correlation.

Results

1. Reliability of the relationship of composite of biographical items as shown by the error of the difference formula.

In these tables we have used only the cases of Group II, the group of 186

full-time, one year, urban agents. The variables which were taken under consideration were (*a*) age, and each of the other personal history items and production, and (*b*) education and each of the other personal history items and production.

Significant differences

The significant differences are few in number, and yet these differences found significant within certain age and education intervals, are in keeping with the findings in other parts of this investigation.

When the three-fold tables are made on the basis of age at contract, the following combinations of items are found to meet the less rigid requirements of reliability, that is, the difference, to be significant, should equal at least twice the error of the difference.

Age 25 and under

It is favorable:

1. To be married.
2. To have one or more dependents.
3. To carry $5000 or more life insurance.
4. To belong to three or more different kinds of clubs.

It is unfavorable:

1. To belong to less than three different kinds of clubs.

Age 26 to 29 years

No significant differences.

Age 30 to 35 years

It is favorable:

1. To have three or more dependents.
2. To have attended college.
3. To have had eight or more years of other selling experience.
4. To carry $5000 or more life insurance.
5. To belong to five or more clubs.

It is unfavorable:

1. To carry less than $5000 life insurance.
2. To belong to less than one club.

Age 36 to 39 years

It is favorable:

1. To carry $5000 or more life insurance.
2. To belong to three or more clubs.
3. To have had four years or more of previous selling experience.

Age 40 to 45 years

No significant differences.

Age 46 and over

It is unfavorable:

1. To have less than three dependents.
2. To have a college education.

The reader will notice that differences in number of dependents, amount of life insurance carried at contract, and number of club memberships are the ones most emphasized.

2. Relationship of composites of biographical items to production as shown by partial correlation coefficients

The final method used in obtaining a composite was by the method of partial correlation. We found three regression equations, each equation having five variables. The first equation was derived from Group II, the second from Group VI, and the third from Group VI, eliminating agents belonging to more than seven clubs, being more than fifty-two years of age at time of contract, and having twenty years or more of selling experience. These extreme cases were causing nonlinearity, so we removed them, realizing that it was not statistically justifiable, but wishing to see how the weightings in the previous equation would be changed. For Group II the following equation was derived:

$$X_1 = 3.2X_2 + 9317X_3 + 106X_4 + 5534X_5 + \frac{}{26880}$$

where X_1 = production
X_2 = amount of insurance carried at contract
X_3 = number of clubs
X_4 = age at contract
X_5 = number of dependents at contract
R = 0.40

For Group VI the following equation was derived when all full-time agents were included.

$$X_1 = 9.65X_2 + 4075X_3 + 2212.5X_4 + 5318X_5 + 30913.48$$

where X_1 = production
X_2 = insurance carried at contract
X_3 = number of clubs
X_4 = age at contract
X_5 = total life insurance experience
R = 0.36

For Group VI (linear) this equation was found:

$$X_1 = 6.25X_2 + 640X_3 + 1237.5X_4 + 7147.3X_5 + 14245.9$$

where X_1 = production
X_2 = insurance carried at contract
X_3 = number of clubs
X_4 = age at contract
X_5 = total life insurance experience
R = 0.40

The zero order correlations are found in tables 2,3 and 4. The chief points to be noted are (*a*) that number of clubs and insurance carried at contract are important items in all groups, and (*b*) that all of the multiple correlation coefficients lie between 0.35 and 0.40.

EVALUATION OF SCORING METHODS FOR PERSONAL HISTORY RECORDS

Purpose

In the previous sections we have found the relationships existing between individual personal history items and production, and also between a composite of several biographical items and production. These relationships, as indicated by the coefficients of correlation, and the standard error of the difference formulae, have been slight but persistent.

In the present section, we shall report on the results found when we scored a group of personal history records using the scoring methods devised by Miss Cope, Miss Goldsmith and Dr. Ream, and also two methods devised during this investigation.

The purpose in using the weightings given by other investigators was not to compare the discriminative values of various methods. Such comparisons would not be valid as we were not able to use these investigators' complete weighting systems because our records did not include all the necessary information. The main purpose in using several scoring methods on the same agents was to see the variations in the weightings obtained for specific personal history items. However, we do think the correlations between total scores and the criterion are also of importance, since they are of about the same degree as correlations found throughout this study.

Predictive value of several scoring methods

The blanks scored were fifty-five in number, the records of agents hired by two of the companies within the preceding year. The new method which we have tested out is a percentage method similar to the one used by Miss Cope (1) in her recent pamphlet "Selecting Salesmen." The agents in Group II were studied. The weightings were found by getting the percentage of successful agents in each interval of each personal history item. Agents producing $75,000 or more were considered successful. On the basis of production, 53 per cent of the total group were successful. The per cent of successful agents in each interval of each of the personal history items, was the scoring device.

With this group of 55 cases, the correlations of the composite scores on the weighted personal history records with production were:

$r = +0.41$ Cope method
$r = +0.34$ Manson method
$r = +0.28$ Ream method
$r = +0.15$ Goldsmith method

But Miss Cope, Miss Goldsmith and Dr. Ream have been more interested in establishing critical scores than in finding correlation coefficients. Our next interest then was to plot a group of composite scores to see if any of the methods would give a critical score which would separate successful from unsuccessful agents. In this case, we have used agents from but one company. In order to have enough cases we added a few agents having two years' experience with the company (61 cases in all). However, we have demanded a higher production from the two year men in order to consider them successful, namely $100,000. Results gained from these data scarcely justify the establishment of critical scores.

The second type of scoring method devised in this study was based on the regression equation found for Groups II and VI. The variables included in the equation for Group II were:

$$X_1 = 3.2X_2 + 9317X_3 + 106X_4 + 5534X_5 + 26880$$

where X_1 = production
X_2 = amount of insurance carried at contract
X_3 = number of clubs
X_4 = age at contract
X_5 = number of dependents at contract

The group scored consisted of 44 agents, representatives of the two companies previously mentioned, all agents having but one year's experience with the company. The correlation coefficient between the scores made and production was 0.41 ± 0.08.

The final procedure was to score the application blanks of 21 agents from a single company, all agents having two years' experience. The weightings used were the regression coefficients in the linear equation for Group VI.

$$X_1 = 6.26X_2 + 6450X_3 + 1237.5X_4 + 7147.3X_5 + 14245.9$$

where X_1 = production
X_2 = amount of insurance carried then
X_3 = number of clubs
X_4 = age at contract
X_5 = total life insurance experience

The correlation between the actual production and the predicted production was $r = 0.37 \pm 0.13$.

Conclusions as to the predictive value of several scoring methods

We have tested the predictive value of composites gained by weighting several items in the application blank. We have found that the predictive values of these composites are only about as great as correlations which center about 0.40 would indicate. Rugg interprets correlation as being "present but low" when r ranges from 0.15 or 0.20 to 0.35 or 0.40. This is about the range of the correlations between our composites and production. Such correlations are not sufficiently high to justify using the weighted personal history record as the sole basis for selection, or even to use it in place of intelligence or special ability tests. However, correlations of this size do show that the personal history record should be included along with tests, graphic rating scales, interest analyses, and the good judgment of the experienced interviewer in any selection program.

IV. CONCLUSIONS

EVALUATION OF THE PRESENT INVESTIGATION

The purposes of the present investigation, as stated in the introduction, have been (*a*) to determine what relationship exists between certain items of a man's previous experience or personal history and his subsequent ability at selling life insurance, and (*b*) to evolve a scoring method whereby each of the personal history items is given such weighting as the results of the previous research would designate; the total weighted score to be used as an index of the applicant's future success in selling life insurance.

The personal history and production records of 4178 life insurance agents, the representatives of eighteen different life insurance companies, have been examined. Of this number, 4021 have been used in the course of the investigation. The remaining 157 blanks had to be eliminated either because the production records were missing or obviously in error, or else because the personal history records were so incomplete that they contained little information other than the name of the agents. Certain agents had joined their companies late in 1921 or early in 1922. The 1921 production records for these agents were not available, therefore they could not be included in any part of the investigation in which a criterion of success was necessary. The records of full-time and part-time agents have been handled separately. There were in all, 2045 full-time records, 386 of which did not have complete 1921 production records. There were 1976 part-time records, including 451 cases with incomplete 1921 production records.

The relationship existing between each personal history item and production has been ascertained by finding the coefficients of correlation. In practically all cases, these coefficients have been low and positive. This indicates that some relationship existed between the item under consideration and production, but that the correspondence of tendencies was

not sufficiently marked to make possible a reliable prediction of the amount of production from the amount of the personal history item.

Intercorrelations of personal history items have been in most cases higher than the correlations with the criterion, showing that correlations with the criterion are the functions of more than one personal history factor. When several of the biographical items have been weighted and a composite score obtained, the correlations have been increased, these correlations centering around +0.40.

This correlation scarcely shows a marked correspondence of tendencies but is sufficiently high to warrant the inclusion of the Agent's Experience Record in a selection program.

We have made and tested out two scoring methods. The one was based on the per cent of agents who possessed each of the personal history characteristics and were successful. The other was based on regression coefficients. The reliability of the results obtained by the use of each of these methods is as questionable as a correlation of 0.40 would suggest. The scoring methods devised by other investigators yielded similar coefficients. This does not imply that selection by means of a weighted application blank may not be quite as efficient as the personal opinion of some general agents. It does say that the application blank should be supplemented by other selection aids.

The reasons for the low correlations are many. It may be that the information contained on the Agent's Experience Record has no more relation to subsequent success in selling life insurance than a correlation of 0.40 would indicate. On the other hand, it may be that our sampling of agents is not a random one and that we are discriminating between degrees of success rather than between success and failure. Another likelihood is that differences in supervision, training, territory and organization have offset differences in personal history qualifications.

Suggestions for subsequent studies

In making other studies, we should recommend that the blanks be collected directly from the home office rather than from the personal history records sent out. Records should be uniform, therefore the collecting process would have to extend over a one or two year period. Thirty or forty companies could coöperate in such a program.

All applicants for positions, both those who are accepted and those who are rejected, should fill out these personal history records. A service record should be kept for each man. This record should contain items of information concerning the territory where the agent is selling, the general agent and supervisor under whom he is working, his production record for the first six months, his ranking in the agency for the first six months, and his ranking in comparison with other agents in other territories having equal service. Production records should be secured again after the first year's service and as frequently thereafter as the companies find practicable.

The benefits derived from such a study would warrant the tediousness

of the process. The only way that a reliable measure of the differences in territory, training, supervision, and the host of contributing factors can be determined, is to go to the smallest units of organization, the general agency or sub-division of it, and control one or another of these factors. If enough general agencies are studied, the repetition of the process from general agency to general agency will verify results even though the number of agents in any one agency is small. The by-products of such an investigation will undoubtedly be of surprising value.

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Research in Selection of Motormen

Part I. Survey of the Literature

By Morris S. Viteles, *University of Pennsylvania*

During Dr. Viteles' tenure as Consulting Psychologist to the Milwaukee Electric Railway and Light Company in 1920-22, this comprehensive study of methods of selecting motormen was initiated. It has been carried forward by Mrs. Sadie Myers Shellow, who has been with that company since 1923.

The literature on tests for scientific selection of motormen has increased steadily since Münsterberg's first investigation made some thirteen years ago. Germany, with characteristic thoroughness, has taken perhaps greater strides than any other country. The progress of research there as well as in France, Belgium and America is here summarized.

Succeeding numbers of the Journal *will contain full descriptions of the psychological tests devised and installed by Dr. Viteles, and of the evaluation of the present selection methods of the Milwaukee Company being made by Mrs. Shellow.*

THE purpose of this article is to summarize the published reports of research in the selection of motormen, and thus to clear the ground for two succeeding articles descriptive of experimental work which has extended over a period of five years.[1] During this time there has been developed selection apparatus and an experimental technique which, when properly administered, can be of service in the selection of motormen. In addition to the discussion of experimental data already obtained, there will be presented a program which is to be

[1] These articles will be concerned almost exclusively with the use of *psychological tests* and of the *clinical method* in the selection of motormen. The authors recognize the importance of the physical examination and of the so-called non-test factors, such as age, former occupations, city or country residence, etc., in scientific selection; but these will not be considered in detail at the present time. For a more detailed treatment of non-test factors the reader is referred to *Scientific Selection of Employees.* T. W. Gerhardt. Electric Railway Journal, May 20, 1916, Vol. 47, No. 2, pp. 943–953; *Tests Used in Selecting Employees.* M. McCants. Electric Railway Journal, Vol. 60, No. 18, pp. 710 ff.; *Application of Scientific Methods in Industrial Analysis.* F. L. Dunham. Electric Railway Journal, October 7, 1922, Vol. 60, No. 15, pp. 554 ff.; *Personnel and Training for Transportation Employees.* Electric Railway Journal, October 7, 1922, Vol. 60, No. 15, pp. 590 ff. For a general discussion of the place of tests in the selection of workers, particularly of trainmen, the reader is referred to

placed in operation for the further evaluation of the selection apparatus and of the technique which has been developed.

AMERICAN INVESTIGATIONS

Pioneer work of Münsterberg

The earliest work in the scientific selection of motormen is the well known investigation of Münsterberg, undertaken in 1912, at the suggestion of the American Association for Labor Legislation.[2] His experimental work grew directly out of an informal meeting of men interested in electric railroading and psychology held in March 1912, under the auspices of that Association. In the course of this conference, the importance of considering the place of "human frailty" in accident causation was discussed. There was emphasized, possibly for the first time, the need for providing measures of the "mental qualities for a class of work in which life and limb and financial success are at stake," as a means of decreasing the number of accidents attributable to the human element in street car operation. The proportion of such accidents was at that time estimated by some to be as high as 80 per cent of all accidents.

Necessary Physical and Mental Requirements of Platform Employees. John Leeming. Electric Railway Journal, March 11, 1922, Vol. 59, No. 10, pp. 404 ff.; *Standardized Methods of Employment.* C. S. Yoakum. Electric Railway Journal, April 22, 1922, Vol. 59, No. 16, pp. 679 ff.; *Psychological Tests Must Be Based on Facts.* N. L. Hoopingarner. Electric Railway Journal, April 29, 1922, Vol. 59, No. 17, pp. 716 ff.

[2] *Psychological Tests for Accident Prevention.* Electric Railway Journal, March 9, 1912, Vol. 39, No. 10, pp. 394–95.

Münsterberg[3] set out to devise a test for the selection of those men who would be least likely to have accidents in the operation of a street car. He decided, after careful observation, that the process which seems to be the "central one for the problem of accidents" was "a particular complicated act of attention by which the manifoldness of objects, the pedestrians, the carriages, and the automobiles are observed with reference to rapidity and direction in the quickly changing panorama of the street." In the avoidance of accidents "the ability to keep attention constant, to resist distraction by chance happenings on the street, and especially the always needed ability to foresee the possible movements of pedestrians and vehicles" were found by him to be of greatest importance. "The companies claimed," according to Münsterberg, that "there are motormen who practically never have an accident because they feel beforehand even what the confused pedestrian and the unskilled chauffeur will do, while others relatively often experience accidents of all kinds because they do not foresee how matters will develop."

The apparatus designed by Münsterberg to measure the mental abilities of importance in avoiding accident consists of a black wooden box, covered by plate glass, over which there is a black velvet belt 8 inches in width. This velvet belt moves over two cylinders at the front and rear ends of the apparatus. In the center of the belt is a window 4½

[3] Hugo Münsterberg. *Psychology and Industrial Efficiency.* Boston: Houghton Mifflin, 1913, pp. 63 ff.

inches in width and 2½ inches high. Beneath the belt are placed 12 cards, each 4½ inches wide and 13 inches long. Each is provided with a handle. The card is supposed to represent a street. Two heavy lines, ½ inch apart, go lengthwise through the center of the card, and accordingly a space of 4½ inches remains on either side. The whole card is divided into small ½ inch squares each of which is considered as a unit. Lengthwise there are 26 units. The 26 squares which lie between the two heavy vertical lines are marked with the printed letters of the alphabet from A to Z. The two heavy vertical lines represent an electric railway track on a street. On either side of this the four rows of squares are filled, in an irregular way, with black and red digits of the first three digits. Digit 1 represents a pedestrian who moves just one step, and that means from one unit to the next; digit 2 a horse, which moves twice as fast, that is, two units; and digit 3 an automobile which moves three times as fast, that is, three units.

Black digits stand for men, horses and automobiles which move parallel to the track and are therefore to be disregarded in looking out for danger. The red digits move from either side toward the track, and are therefore the dangerous ones. The idea is that the man to be experimented on is to find as quickly as possible those points in the track which are threatened by red figures, that is, those letters in the 26 track units at which the red figures would land, if they make the steps which their numbers indicate. Thus, a red digit 2 which is two steps from the track would land on the track and therefore represents danger; a red digit 2 which is one unit from the track is to be disregarded, because it would cross the track and be out of danger. The same principle holds for all red digits.

When the front cylinder of the apparatus is turned by a metal crank, the velvet belt passes over the glass plate and the little window moves over the card, with its track and figures. The whole breadth of the card with its central track and its 4 units on either side is visible through the window over an area of 5 units in the length direction. The subject turns the crank with the right hand; the window slips over the whole length of the card; and one part of the card after another becomes visible. The subject simply has to call out the letters of those units in the track at which pedestrians and vehicles represented by the red letters would actually land if they took the the number of steps indicated by the digit. At the moment the window has reached Z on the card the experimenter withdraws the card and the second becomes visible as a second window appears at the lower end of the belt. In this way the subject can turn the crank repeatedly without stopping, until he has gone through the twelve cards. A spring beneath the card presses the lower card against the glass plate as the top one is removed.

The score on this test is determined both by errors and by the time taken to observe the twelve cards. The two are combined into a single score, inasmuch as the prac-

tical problem in street car operation, according to Münsterberg, is to combine speed with the smallest number of oversights.

The test was given by Münsterberg to a group of the best motormen in the service of a street railway company—men who had worked for twenty years practically without accidents; to a group of mediocre motormen; and to a large number of men who had only just escaped dismissal and whose records showed a large number of accidents. The exact number of cases is not stated. Number of accidents seems to have been the basis for the separation of the three groups. The results, according to Münsterberg, "show a far reaching correspondence between efficiency in the experiment and efficiency in the actual service." Moreover, "the tried motormen agreed that they really passed through that experiment with the feeling which they have on their car." He points out, however, that "the experience refers only to those sides of the motorman's mind which make him able to foresee danger points—the most essential factor in accident prevention," and that this test does not measure other mental traits, such as daring, ignorance of local conditions, etc., which may become causes of accidents.

In summarizing the results of his investigation Münsterberg makes it clear that it is still in the first stage, in need of large scale coöperation between science and industry in order to determine the desirable modifications and special conditions which may become necessary in making the employment of men partly dependent upon such psychological tests. Münsterberg's death on December 16, 1916, cut short further contribution from him in a field in which he was preëminently the pioneer.

Adaptation of Münsterberg test

Little use has been made of the Münsterberg test in the selection of motormen, and experimental work with it has been very limited. Gerhardt[4] reports on the use of an adaptation of this test,[5] called an *Observation Test*, in combination with an *Attention Test* (a modified Hard Directions and Arithmetic Test) and a *Judgment Test*, in the selection of motormen. The last is the test devised by Münsterberg for the selection of ship pilots, and requires the sorting of a number of cards upon which are found different letters of the alphabet.

These tests were given to about 20 per cent of the applicants for employment as motormen in Dallas, Texas. The remaining 80 per cent of the applicants were rejected on the basis of physical examination, the time taken to fill out the application blank, the way it was filled out, defects in appearance, etc.

The author found that the so-called *Observation Test*, when given from three to five times to each man and an average taken, brought out "two

[4] *Scientific Selection of Employees.* P. W. Gerhardt. Electric Railway Journal, May 20, 1916, Vol. 47, No. 2, pp. 943-945.

[5] The adaptation takes the form of a moving belt 60 inches in length, to replace the cards, and the use of red and green squares upon which are printed black figures to replace the black and red figures on the white squares found on the original card.

types of undesirable motormen; first the type who makes a few errors but consumes so much time that he would never be able to maintain a schedule, and secondly the type who makes fast time, but may have a collision with anything that chances to pass into the track." He found further that "it was worth while to employ those men who can make the best scores on this test, that is, a minimum of omissions in a reasonable length of time."

The *Attention Test* was given only once to each motorman, and the *Judgment Test* was given from three to five times. All of them were considered in selection, the analysis of performance in the case of the *Judgment Test* being given more weight than the actual score.

Standards were obtained by giving the entire series of tests to men already in service, and "an especial attempt was made to secure tests on men who had been previously discharged for incompetency and recklessness in handling cars." The author states that "the tests so made correlated with incompetency and recklessness to an unusual degree." It is reported that higher grades of men were secured by the use of these tests, thereby reducing accidents and increasing the good-will of the patrons. Labor turnover was decreased. It is further pointed out that the use of this test "was largely in the nature of an experimental investigation which should be improved and amplified."

The validity of Gerhardt's conclusion depends upon a number of variables which receive no consideration by this author. He fails, for example, to state the number of cases examined by him. The fact that the test was given "from three to five times" suggests that the procedure in using the test was not a standardized one. Moreover the criteria of competency and incompetency on the part of the experienced men with which the test results are compared are not stated. There are indications that the criteria were very general in nature, lacking exactitude and consistency in comparing man with man. There are other factors which tend to lessen the significance of this investigation and to suggest that the conclusions drawn by this experimenter do not have a very high degree of validity.

There is no further report in the literature of this country on experimental work with the Münsterberg test. Fontègne[6] and Claparède, working in Geneva, gave this test to 30 motormen. The results of this experiment are not stated in detail and lead to no definite conclusions. The investigators recommend certain changes in the test and in the procedure for using it.

Non-test factors in selection

Very few investigations, involving in each case the use of tests other than that employed by Münsterberg have been carried through in this country. Two interesting studies are reported by McCants,[7] of the

[6] Julien Fontègne, *L'Orientation Professionelle et La Determination des Aptitudes.* Delachaux et Niestle A. S., Paris, 1921.

[7] *Tests Used in Selecting Employees.* M. McCants. Electric Railway Journal,

Market Street Railway Company of San Francisco. In the first of these the superintendent of each of five divisions selected the five best and the five poorest motormen in his division. The records of these men were submitted to study. The analysis of the application blanks of these men and of additional information furnished by the Division superintendent led to the following conclusions with reference to non-test factors in selection. Citizenship, complexion, color of hair, weight, and number of dependents, are not significant in hiring competent men. Likewise, previous occupation is no criterion of success as a motorman. Height, age, and place of birth seem to be of value in distinguishing between the best and poorest motorman. The "best group are largely drawn from American and North European stock, while the poorest group tend to be drawn from Mediterranean and Irish stock. The best group carries more insurance, owns more real property, possesses total greater wealth and completes more school grades in the same time than the poorest group. The poorest group furnishes the only serious cases of domestic infelicity and financial worry."

Relation of intelligence to success

In addition to the examination of non-test factors, the Army Group Tests were used to discover if general intelligence bore any relation to success as a motorman. These tests were given to 24 of the best men and to 23 of the poorest men. Those with "fair educational back ground" were given the Army Alpha and the others the Army Beta. The percentile scores of the best men ranged from 26 to 98, whereas 14 of the 23 poorest motormen made scores below the 26 percentile. These facts, according to the author, "seem to indicate that the lowest one-fourth of our general population in regard to intelligence are not good motorman material." The intelligence scores were correlated, among other things, with rankings on whether the motorman is "cool, keeps his head, is not excitable, is deliberate, even tempered and self confident." The coefficients given by this comparison range in value from +0.02 to +0.63 with a median of +0.20. In spite of the fact that only ten men, in some cases less, were ranked by each superintendent, and in spite of the range and of the low median value of the correlation the author concludes, very unjustifiably, that these correlations, "indicate that intelligence (as tested) is a positive factor in the very important duties of avoiding accidents." He also concludes that there is "a reasonably high correlation between general intelligence and traits and duties which are important for motormen," and that "among the best motormen there is no greater tendency for the more intelligent men to leave the service than the least intelligent men."

During the latter half of 1921 a self-administrative general intelligence test was given to 90 platform

October 28, 1922, Vol. 60, No. 18, pp. 710–715. See also, *Selection and Training of Employees*. M. McCants. Electric Railway Journal, October 21, 1922, Vol. 60, No. 17, pp. 679–681.

men entering the service of the same company. The scores of these were later compared with superintendents' ratings of "above average," "average" and "below average" from the point of view of service. The differences in the average score of the three groups were not found to be significant. There was found to be a small, although positive relationship between test score and value to the company among those who remained with the company. The relationship was not close. Test scores seemed to have little, if any, relation to length of service.

Employers' interest in psychological tests

It is interesting to note that Gerhardt and McCants are both practical railroading men and not psychologists. The interest of transportation men in the subject of psychological tests for use in selection is indicated further by a report of a Committee on Personnel and Training of Transportation Department Employees[8] made to the American Electric Railway Traffic and Transportation Association in 1922, recommending the experimental use of a battery of tests including a *Hard Directions Test*, a *Memory Span Test*, an *Oral Test for Memory*, a *Judgment Test*, and a *Test of Prompt Motor Reaction* in the selection of trainmen.

GERMAN INVESTIGATIONS

The foregoing discussion covers the most important contributions to date in the use of tests for selecting motormen in this country. Considerable work on the scientific selection of motormen has been done in Germany.

The first edition of Münsterberg's *Psychologie und Wirtschaftsleben* (*Psychology and Industrial Efficiency*) appeared in Germany in 1912. This account of his American experiment is the first reference in German literature to the use of tests for the selection of motormen. Piorkowski,[9] writing in 1915, criticizes Münsterberg for his failure to test motor responses as well as attention qualities in his testing program for the selection of motormen. He points out that an individual may be perfect from the point of view of the ability to attend to a series of stimuli and still be deficient in the capacity to give the selective responses, a capacity which is most important in the avoidance of accidents. "It is not enough," he writes, "that the motorman pay consistent attention and that he does not fatigue easily: he must also be able to react correctly to quick and unexpected incidents." Similar criticism is made by other German investigators, and the measurement of selective responses characterizes practically all of the tests which have been devised for use in the selection of motormen in that country. The insistence upon measuring motor responses represents, in part, the influence of investigations which had already been made

[8] *Proceedings of American Transportation and Traffic Association*, 1922. See also, Electric Railway Journal, October 7, 1922, Vol. 60, No. 15, pp. 589 ff.

[9] *Beiträge zur Psychologischen Methodologie der Wirtschaftslichen Berufseignung.* Curt Piorkowski. Zeitschrift für Angewandte Psychologie, Beiheft No. 11, Leipzig, 1915.

in the selection of aviators, chauffeurs, etc.

Experiments in the selection of motormen in Germany were undertaken almost simultaneously by a number of investigators. Among the earliest is an investigation undertaken by Stern[10] in 1917, who gave an attention test to 6 women applicants for employment as street car drivers. The apparatus used in this first study was one devised by Kehr and slightly modified by Stern. It consisted of a long band of paper covered with letters which passed before the subject at a uniform rate. She was required to react with pressure on a telegraph key at the appearance of certain letters. Moreover, upon the appearance of red letters, interspersed irregularly among the black, she responded by moving a lever with the left hand. In certain cases both hands were used in reacting. The band carried 416 letters of which 80 called for reaction on the part of the subject. Six and one-half minutes was spent on the test.

The investigation served only to indicate more clearly the nature of the problem and to suggest the steps to be followed in a second investigation made possible by a special grant made by the Government to the Hamburg laboratory for this purpose. For this second study, started by Bobertag and completed by Hildegard Sachs,[10a] a special apparatus for selecting motormen was developed. This apparatus was designed to test distribution and duration of attention to varied stimuli and the consistency of responses to expected and unexpected stimuli, some of which require a response and others of which do not. The subject stands before an endless black belt, which moves continually toward him. This belt represents the tracks as he sees them from the front platform of the moving car. In this belt are cut single holes representing pedestrians, and double holes representing vehicles. Each of these, as it appears, becomes a stimulus which may call for a reaction on the part of the subject, but it is only when these holes are illuminated from below that they are to be considered as actual danger signals demanding reaction on the part of the subject. These holes can be illuminated unexpectedly in four different sections of the frame over which the belt runs. The subject's reaction to each signal is conditioned upon the distance of the signal from him: whether he responds with a pedal (foot), or with the brake (right hand), or with the emergency brake (left hand) depends upon the distance of the signal both in the case of the single light (pedestrian) and double light (vehicle). Moreover, unexpected stimuli calling for responses appear in the way of lights placed at the sides of the room at varying distances from the subject. In addition there is a colored aperiodic light, the flashes of which the subject must count. The examination lasts long enough to introduce the element of fatigue.

At the time of the first report (1920) the test had been given to

[10] *Über eine psychologische Eignungsprüfung für Strassenbahnführerinnen.* Wilhelm Stern. Zeitschrift für Angewandte Psychologie, 1918, Vol. 13, pp. 91–104.

[10a] *Studien zur Eignungsprüfung der Strassenbahnführer.* Hildegard Sachs, Zeitschrift für Angewandte Psychologie, 1921, vol. 17, pp. 199–225.

20 motormen, 10 employed by the Hamburg Street Car Company, and 10 employed by the Hamburg Altona Central Station. In both cases test results were compared with descriptive judgments of the efficiency of these men furnished by the street railway companies. In the case of the first 10 motormen there is a disagreement between test results and efficiency rating in the case of only 1 man. In the second investigation ratings agree only in the case of

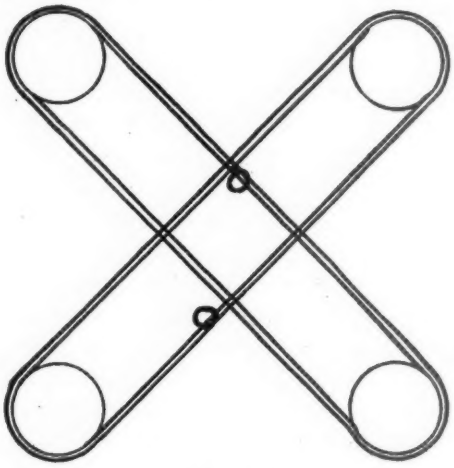

FIG. 1

5 men. An analysis of the apparent disagreement in the case of the other 5 men leads the author to conclude that only in the case of 1 man is there a real disagreement which can be ascribed to the failure of the test as a diagnostic instrument. In the latest available report from the Hamburg laboratory (1922), the statement is made that this test has not been put to practical use in selecting motormen.

In the study made in this laboratory a test designed to measure judgment of distance and speed was also used. No description of this test is given, but in an article published in 1921, Kafka[11] describes two new tests for measuring the judgment of distance and speed as used in avoiding accidents, the first of which is a revision of a test used in the Hamburg laboratory. This consists of two bisecting parallelograms (see fig. 1). Around the outer edge of each is placed a moving belt carrying a marker, one representing a pedestrian: the other a street car. The two move at different rates of speed and may collide with each other in one of four directions at any point within the square formed by the crossing of the two parallelograms. The subject controls the movement of the marker representing the street car (which is activated by a motor) and is required to speed it up as fast as possible and at the same time prevent the two markers from colliding.

The second test is made a part of the Hamburg laboratory motorman test. In this case a series of lights appearing in quick succession in a row represents a pedestrian walking toward or over the tracks, upon which a street car represented by a marker is traveling. By varying the time intervals between the lights the pedestrian can be made to walk at different speeds. Moreover, the walking pedestrian can be made to appear in any of the four sections into which the track has been divided, and the

[11] *Zwei Neue Apparate zur Eignungsprüfung der Strassenbahner.* Gustav Kafka. Zeitschrift für Angewandte Psychologie. 1921, Beiheft 29, pp. 95 ff.

row of lights are so placed that he can be made to approach the track from different angles. At the appearance of danger the subject is required first to give a warning signal, and in the case of the menace of an immediate collision, to apply the brake. The time interval between the appearance of the danger signal and the warning signal and the interval between the braking reaction and the actual collision on the track (symbolically represented by the lights) are recorded and determine the subject's score on the test.

Tests used by the Greater Berlin Tramway Company

The most extensive study in the selection of motormen in Germany is the one made by Tramm[12] of the Greater Berlin Tramway Company. Experimental work with tests for the selection of motormen was first started by this company in February, 1919. At that time 10 tests, including cancellation, arithmetic, memory, technical judgment, fear tests, etc., were used to select the best 10 drivers from among 36 applicants. On the basis of test scores two of these were given ratings of "very good"; three ratings of "good"; and five were given ratings of "satisfactory." These 10 men were then trained and observed over a period of four years. In spite of the simplicity of the tests used, only 1 of the 10 men, and he was one of those who had been rated as "satisfactory," proved to be an unsatisfactory motormen.

Following this preliminary investigation a series of tests, including tests of fear control, vision, knowledge of regulations, and reaction in times of danger, was given to 1035 ex-drivers upon their return from the World War. On the basis of their scores on these tests 87 per cent were classified as "satisfactory"; 6.5 per cent as "not satisfactory"; and the remaining 6.5 per cent as in need of additional training.

In July 1919, a battery of tests was set up in a newly erected testing room. Between that time and June 1923, 650 men, 25 to 30 per cent of whom have proved to be incompetent for street car operation, have been examined by means of these tests.

The tests used by the Greater Berlin Tramway Company[13] "require that the subject be placed on a driver's platform fitted with special arrangements for ordinary and frightening light and sound signals.

"Previous to the test the candidate is instructed in the operation of the controller and brake levers, and in the meaning of signals used. In the course of the test these signals are given suddenly. Upon their appearance the candidate is expected to perform the operation in which he has been trained.

"To test how a candidate will behave in the event of a danger, whether he will lose his wits to the extent of letting go the controller

[12] *Die Bewährung des psychotechnischen Prüfverfahren für Strassenbahnführer.* K. A. Tramm. Industrielle Psychotechnik, 1924, Vol. 1, Nos. 1–2, pp. 36–42.

[13] *The Selection and Training of Street Car Drivers on Psycho-Technical Lines.* K. A. Tramm. Verkehrstechnik, Vol. II.

handle and brake and passively stand by, or whether he will promptly take measures required for the safety of his car and passengers, the man is placed before a controller handle, and while he is practicing with it he is frightened by a sudden report, a short-circuit flash passing before his eyes or the floor yielding below his feet. If he loses his presence of mind in these circumstances, the company knows that he should not be intrusted with the care of a car. If, on the other hand, he promptly performs such manipulations as were recommended to him in the event of anything unforeseen happening before his eyes, he is considered to possess the presence of mind required for his responsible profession."[14]

Another test of cold-bloodedness or "nerve" is provided by a board painted to represent a miniature track. Electrically lighted obstacles suddenly appear on the track, and the presence of mind of the prospective motorman is gaged by the rapidity with which he turns his dummy controller handle to the off position and applies the brakes.

Another test intended to determine the presence of mind and promptness of decision of the applicant is an apparatus consisting mainly of two vertical rods. After placing himself in front of these rods, the candidate must put his hands around them without, however, actually touching them. Then, while he is looking at the objects in front of him, he must try, as soon as the rods start falling, to seize hold of them and stop them. The farther down the rods are allowed to fall before the man succeeds in catching hold, the less may his promptness of decision be relied upon and the more unsatisfactory will be the result of the test.

To test a candidate's visual powers, he is handed some cast iron letters and asked to keep them in the same position as he sees them on a board installed some distance away. His ability to distinguish the various signal lights is tested by means of a plate on which colored figures are visible on a differently colored background. Color-blind persons are, of course, unable to read these figures.

To test night vision, the candidate is directed to insert his head in an oblong casing closed on all sides, and after waiting for from one to two minutes, or just the time required to accommodate himself to the darkness, he is asked to state how the letters seen inside the casing are standing upright, at an angle, or upside down. A slide operated by the inspector in charge of the test at the front of the casing allows the darkness to be reduced or increased at will.

Another set of tests is intended to examine the steadiness of the hand. The would-be motorman is asked to seize the handles of two vertical rods which fit with a certain amount of play into slots in a metal plate. As long as he keeps his hands quiet, the circuit of an electric bell is interrupted. However, as soon as his hands begin to tremble ever so little, these rods will touch the edges of the

[14] *Psychological Tests for Motormen.* Alfred Gradenowitz. Electric Railway Journal, January 28, 1922, Vol. 59, No. 4, pp. 144 ff.

slots, thus actuating the bell, and the candidate must try to keep the rods quite so as to silence it.

A test with one crank designed like a controller crank, and another like a brake lever, both connected so that independently they turn a disk, belongs to the same group. The applicant is asked to turn the disk by one crank and then by the other into the various traveling positions, without touching the edges of the slot. Whenever he fails to comply with this request, an electric bell is sounded.

Inasmuch as a skillful motorman should know at once whether his car at a track crossing may start in advance of others, Mr. Tramm has designed a board on which a number of pictures of street cars are mounted and can be set so as to occupy various positions with regard to one another. When the instructor actuates an electric switch, these cars can be lighted up in any desired combination. The candidate should state immediately the number of the car entitled to start in advance, according to the traffic rules in force.

Finally, tests of intelligence are made to ascertain his professional fitness. To make sure that he is capable of understanding certain technical facts, he examines, under an instructor drawings of the machinery of a car illustrating the motor suspension with gearing, and is asked in which direction the car will travel in case the pinion and then the gear rotates in a given direction, whether the pinion or the gear has the greater number of revolutions per minute, in which direction the brake lever should be moved to stop the car, etc.

An evaluation study has been made of these tests[15] in which an experimental group of 50 apprentices who were tested before selection, were compared with a group of 50 apprentices hired without the psychological examination. In the first year of employment the motormen in the control group, that is, those who had not been examined, had 50 per cent more accidents than those in the experimental group who had been examined and had passed the psychological test. In the second year of employment the experimental group again had 40 per cent less accidents than the control group.

Another study has been made to determine the reliability of the individual tests used in selection. In this study twenty-seven unsatisfactory drivers, that is, drivers who had had more than four accidents during the last two years of employment, and a group of twenty drivers who had had no accidents during the same period of time, although working under the same conditions, were selected. As Tramm points out the number of cases was small but the results are nevertheless significant. A comparison of the two groups and a detailed analysis of the individual test scores showed differences in reliability among the individual tests. For example, the rapidity of perception as measured by the tachistoscope proved to have little significance, having the reliability of only 50 per cent; hearing tests showed a high reliability; strength tests were shown

[15] *Die Bewährung des psychotechnischen Prüfverfahren für Strassenbahnführer.* K. A. Tramm. Industrelle Psychotechnik, 1924, Vol. 1, Nos. 1-2, pp. 36-42.

to have little reliability, etc. Among the tests with high reliability were those of hand movements, perception of movement, and reaction to danger. The central reliability of the combined scores was shown to be 85 to 90 per cent.

In addition to increasing the reliability of selection from 40 to 60 per cent the psychological examination used by the Greater Berlin Tramway Co. has also brought about a diminution of 120 hours in training time. Moreover, a marked reduction in the use of current and the cost of repair has followed the introduction of the psychological tests and improved methods of training.[16]

Summarizing the conclusions from the evaluation studies of the tests used by the Greater Berlin Tramway Co., it is found that:

1. Men passing the psychological tests have 40 to 50 per cent less accidents than men hired without psychological examination.

2. The tests have been found useful in re-hiring experienced drivers.

3. The reliability of the combined scores from all the tests is 85 to 90 per cent.

4. The median reliability of the individual tests is 70 per cent.

5. Training time has been decreased by 120 hours through the scientific selection of motormen.

In the article from which the above conclusions are abstracted Tramm hazards the opinion that fatal street car accidents can be decreased by at least 20 per cent by adequate selection of street car drivers.

Another and distinct investigation in the selection of motormen has been carried through by Schackwitz.[17] The test used by him is a modification in the direction of increased complexity of a test devised by Moede and Piorkowski for the selection of chauffeurs.[18] The method of testing

[16] The usefulness of the test is suggested in a report by the Greater Berlin Tramway, published in 1922, in which it is stated that there was a reduction in the number of serious accidents from 1.6 to 1.1 and of minor accidents from 42 to 29 per 1,000,000 kilometers, a decrease of 50 per cent in the length of the training and a marked reduction in the use of current and the cost of repair after the introduction of psychological tests, improved method of training and a change in organization based upon psychological principles. According to Dr. Piorkowski, a saving of over 12,000,000 marks (July, 1922) had been achieved in one year. See Morris S. Viteles *Psychology in Business —in England, France and Germany.* Annals of the American Academy of Political and Social Science, November, 1923, Vol. 110, pp. 207–220.

[17] Schackwitz. *Über psychologische Eignungsprüfungen für Verkehrsberufe.* Berlin: 1920. Reviewed in Praktische Psychologie, 1920–1921, Vol. 2, pp. 125 ff.

[18] The apparatus used by Shackwitz resembles very closely the test devised by Moede and Piorkowski for the selection of chauffeurs. The work on this test was started in 1916 for the purpose of selecting chauffeurs for war service. During the last year of the War, no one who failed to pass this test was assigned to field service as chauffeur. The test which has been given by Moede and Piorkowski to over 24,000 men in fourteen testing stations has been patented in this country, by Piorkowski (1916). The authors measure the qualities of sensory acuity, attention, volition, fatiguability, believing that these are involved in the safe operation of an automobile. Attention is measured by requiring the subject to count the flashes of small lights which appear at irregular intervals on a wall which he faces. While he is counting, there appear in different parts of the room and at irregular intervals large red lights to which he must react by

involves persistence of attention on the part of the subject to a series of stimuli and reaction to a number of unexpected stimuli. The test was given to 67 street car drivers (men and women). A follow up study of those examined showed that nine out of ten street car drivers who had proven to be unsatisfactory workers had also made unsatisfactory scores on the selection test. However, twelve others, who would have been refused employment if the score on the selection test had been considered, were found to be giving satisfactory service after employment as street car drivers. The author concludes from this that the test is not serviceable for selection and further that incompetent applicants for the job of motorman can better be selected by means of a neuro-psychiatric examination. Moede and Piorkowski, who have reviewed the work of Schackwitz, question the validity of his conclusions.

pulling an indicated lever. The time interval between the appearance of the signal and the reaction is measured in thousandth of a second. The test is further complicated by the appearance of yellow lights which must not be confused with the red ones by the subject. Fear stimuli (the blow out of a fuse, pistol shot, etc.) followed by a red light are also introduced and the reaction time in responding to these signals are noted. Moreover throughout the experiment the subject must pay attention to a sound similar to one made by a rotating motor and must note, verbally, changes in this sound corresponding to changes in the speed of a motor.

Other tests are used to measure learning ability, fatiguability, etc. Moede and Piorkowski claim that this apparatus has given unusually good results in the selection of chauffeurs. They do not give an exact description of the procedure used in evaluating the test or a statement of the results which must be made available before their conclusions can be accepted as valid.

INVESTIGATIONS IN OTHER COUNTRIES

An investigation designed to provide tests for the selection of motormen is at present being conducted in Paris under the direction of M. J. M. Lahy, Director of the Laboratory of the Paris Transport Services. One of the tests used by Lahy is constructed upon the assumption that "the driver should be able to attend rapidly to the movements of numerous vehicles and objects *en route*, to heed sounds coming from different quarters, and above all *to react effectively and rapidly to such stimuli*.[19]

"To test these abilities, the experimenter is seated at a small desk on which are fixed various levers, keys and switches, by which he can control signals situated in different parts of the room. The candidate is placed at some distance in front of this table and faces a screen. The room is darkened, and by use of the control switches the experimenter makes lights appear in front, or sound of a bell or horn come from various parts of the room. As each signal is produced, the candidate is instructed to react by pressing certain levers or by depressing suitable pedals in front of him. . . . . During all these tests, accurate records of the moment when the signals are given and when the candidate reacts are automatically recorded in an adjacent room.....

[19] *Economy and Safety in Transport.* G. H. Miles. Journal of the National Institute of Industrial Psychology, January 1925, Vol. 2, No. 5, pp. 192–197.

More emphasis is placed on regularity and uniformity of reaction than on the actual time which elapses between the giving of the signal and the reaction, although, of course, any marked deviation from the normal is taken into consideration.

"The degree of *motor suggestibility* has been found to be closely related to the subject's capability as a driver, and an ingenious arrangement is employed at the Paris laboratory, by which comparative estimates can be obtained." Further, *muscular force and fatiguability* are measured by a special form of dynamometer.

To test the applicant's *ability to estimate speed*, "the candidate is seated ten or twelve feet from, and at right angles to, a long narrow bench on which are three upright pointers indicating vehicles placed at different distances apart. These are set in motion, and the candidate is required to make a rapid estimate as to the point at which one will overtake the other or where one will meet the other. A graduated scale on the bench readily enables him to state the point at which he expects this to occur, but its exact location is by no means easy. The promptness and accuracy of the candidate's reply gives a measure of his ability in this direction. At Barcelona *a high correlation has been found between such laboratory tests and subsequent experience on the road.* In a recent communication to the Director of the National Institute of Industrial Psychology of England, Dr. Mira reports that the frequency of accidents among 35 drivers who did poorly at the tests was 300 per cent higher than among 45 who did well at them."

The rapidity of perception, that is, the *"accuracy with which the driver perceives the essentials of a situation,"* is tested by pictures flashed on a screen in front of him for a very short time, the details of which he is afterwards asked to give.

Many tests have been devised to ascertain the candidate's *"ability to act promptly and properly under mental and sometimes physical stress,"* but it is difficult to reproduce in the laboratory a situation at all equivalent to that occasioned by an actually threatened accident. An attempt is therefore being made to determine whether the candidate's behavior under actual working conditions may be forecasted from alterations in his rate of breathing, pulse, etc., when he undergoes emotional change of a more or less pronounced character. In this connection, too, the indications given by the psycho-galvanic reflex are being studied.

In the laboratory, *tests of memory* of the type required in actual service are also given. Further, during the candidate's training period, he is put through a test on a platform placed immediately in front of a large white screen. On this screen is projected a street scene taken by a cinema camera from the platform of a moving tram car. The road winds; people cross in front; a taxi darts out from a side street; a man steps right in front of the car. The pupil manipulates levers or pedals as required, and his success is viewed as a measure of his fitness for actual work.

At a recent meeting of the International Congress of Tramways and Public Transports, held in Paris, it was reported that "these tests were

applied to groups of new employees, the careers of the employees being followed up through the training school and later during actual service. When the results of the tests, applied to a group of 136 drivers, came to be compared with the practical performances of the candidates tested, *the estimates of their ability, as determined by the laboratory tests, showed an agreement in over 85 per cent of cases with the actual results.*" The criteria of practical performance with which the test results were compared is not stated. It was further stated that through the aid of the tests it is not possible to classify pupils in the training school in much more uniform groups for instruction than before, and progress is correspondingly more rapid. This, coupled with the elimination of unsuitable candidates, has, according to the report, reduced the annual cost of training by about 130,000 francs.

In Brussels an attempt is also being made to determine by a comprehensive test whether the candidate is likely to be good at the work of operating a street car. The candidate "is placed on a platform similar to that of a car, and is given instructions concerning the use of the controls and the methods of working them. He is then confronted with situations which represent as nearly as possible the actual conditions on the road, and his methods of reacting are accurately recorded on registering machines connected directly with the controls on the platform. The way in which he applies his brakes, for instance, when a vehicle is supposed to cross his track, is recorded. He may apply a steady even pressure, or perhaps he grasps his controls convulsively and applies his brake too suddenly. His actions are recorded automatically; and by a comparison of such records with those obtained from a driver of known ability under the same conditions, a forecast of the candidate's degree of suitability can be obtained."[20]

(To be continued)

[20] See note 19.

Book Reviews

PERSONNEL PROBLEMS OF THE TEACHING STAFF

By Ervin Eugene Lewis. New York: The Century Co., 1925. Pp. xvii + 460

REVIEWED BY GLEN U. CLEETON

The title tells the nature of this much needed volume but perhaps the sub-title, "A Study of Some of the Outstanding Personnel Management Problems That Arise in the Administration and Supervision of a Public School System," indicates it more specifically.

The appearance of this book reminds one of the changes that have taken place in the general conception of the position of a "superintendent of schools." In many communities he was, originally, a sort of high grade principal; then he seems to have become general supervisor of pupils, teachers, equipment, buildings, athletics, janitors and other items too numerous to mention. If we interpret the trend aright he now bids fair to come into his own as an administrator. Since a greater part of his administration must deal with personal adjustment problems it is indeed timely that Superintendent Lewis has brought the somewhat meagre literature on the subject and his own contributions together in a single volume.

The opening note of the book is the classification of problems of administration and supervision into two groups; those dealing with "what the French call *matériel*" and those dealing with "*personnel.*" The first group of problems is dismissed at the outset while the latter is pursued to the extent of twenty-two chapters. Just what some of the persistent personnel problems of the public school are may be determined by an inventory of chapter headings of which the following are typical: "Recruiting the Teaching Profession," "Teacher Training," "Certification," "Selections," "Introducing the Teacher to her Work," "Home Talent Teachers," "The Married Woman Teacher," "Measuring Merit of Teachers," "Load," "Salaries," "Resignations and Dismissals," "Turnover," "Tenure," "Legal Status of the Teacher." There are other pertinent chapters. In fairness to the author it should be stated that the chapter headings mentioned above are slight adaptations made for sake of brevity in reviewing.

The entire volume is devoted to problems of the teacher as will be seen by the topics listed. Superintendent Lewis leaves the problem of pupil personnel administration to others. It is quite likely that many superintendents of the smaller school systems, who, by the way, are likely to be the most numerous purchasers of the book, would like a chapter or two devoted to the janitors and other non-teaching help. Some might even like a chapter on "Management of the Board of Education." Seriously considered, however, the reader will find discussions of the superintendent-school-board-teacher relationship interlarded in many of the chapters, especially the last two dealing with "Ethics of the Teaching Profession" and "The Legal and Social Status of the Teacher."

The physical make up of the book is for the most part all that could be expected. The type is fairly bold and readable. Chapters are carefully outlined by means of numerous topic headings. A summary appears at the end of each chapter bearing the title, "Main Points of the Chapter." "Problems for Further Discussion" and

"References for Additional Reading" are two other valuable additions to each chapter. The references offered in this manner are quite exhaustive and provide a splendid bibliography for anyone who wishes to consult current studies on the problems discussed. One wonders why the provision of an index was given so little consideration. Scarcely two pages of random samples are given in the index for the 457 pages of reading matter offered in the text. The table of contents is by far a superior piece of work compared with the index.

The book is what one would expect to find in a field so inadequately organized. There is a great deal of descriptive material, arguments on both sides of conflicting view points, suggested techniques for dealing with problems discussed, a plea for further investigation, and a modicum of data which may be termed "scientific," or, perhaps, "experimental" would be a more applicable term.

Personnel workers in business and industry will find little that can be directly applied to their problems which is superior to material available from other sources; but they will see many points of similarity in problems to those with which they are obliged to deal, and may find the volume stimulating in its suggestions.

Books Received

(Notice here does not preclude fuller notice later)

1. *Employes' Representation in Steel Works.* Ben M. Selekman. New York: Russell Sage Foundation, 1924. Pp. 293. $1.50.
2. *The Prediction of Teaching Success.* Frederick Lamson Whitney. Journal of Educational Research Monographs, No. 6. Public School Pub. Co., Bloomington, Ill. Pp. 85.
3. *De Psychotechnick Der Beroepskeuze.* Dr. J. L. Prak. Bij J. B. Wolters' U. M., Groningen, Den Haag, 1925. Pp. 272. f 4, 50.

   Dr. Prak is industrial psychologist at the N. V. Philips' Gloeilampenfabrieken, Eindhoven, Holland. This book consists of the results of several years' work in the scientific study of vocational guidance and selection.
4. *The Metal Industries of Cleveland.* Mary Price Corre. A Vocational study prepared for the Cleveland Public Schools. 1924. Copies may be secured from the Consumers' League of Ohio, Electric Bldg., Cleveland, O. Price, 60 cents.
5. *Organization of Vocational Guidance.* Arthur F. Payne. New York: McGraw-Hill, 1925. Pp. xvi + 438.

   This book presents the technique and methods of vocational guidance as thus far devised and recommended by authoritative research, experiment, and practice.
6. *The Boy and His Vocation.* John Irving Sowers. Peoria: Manual Arts Press, 1925. Pp. 198.
7. *Workmen's Compensation Insurance.* G. F. Michelbacher and Thomas M. Nial. New York: McGraw-Hill, 1924. Pp. xi + 503.
8. *Psychology in Business Relations.* A. J. Snow. Chicago: A. W. Shaw Co., 1925. Pp. xv + 562.
9. *Report on the Present Position of Vocational Guidance and Vocational Selection.* M. B. Stott. London: The Women's Employment Pub. Co., 1924. Pp. 95.
10. *The Causes of Industrial Unrest.* John A. Fitch. New York: Harper and Brothers, 1924. Pp. xiv + 424.
11. *Genetic Studies of Genius, Volume I.* Lewis M. Terman et al. Stanford University Press, 1925. Pp. xvi + 648. $5.00.

    This volume presents the results of an extended investigation of 1,000 gifted children in California. Volume II, entitled, "Early Mental Traits of Three Hundred Geniuses," will be ready for distribution in September, 1925.

Abstracts

Dust Inhalation and Industrial Tuberculosis. LEONARD GREENBURG. Public Health Reports, February 13, 1925, Vol. 40, No. 7, pp. 291–309.

Outlines very early studies and comments made by writers in olden times on the effects of dusty occupations upon health. Follows this with an analysis of American studies of the ratio of tuberculosis deaths to total deaths in various industries. Studies made by the Census Bureau, the Metropolitan Life Insurance Company, and the Prudential Insurance Company were used, and bring out clearly the excessive tuberculosis ratios characteristic of certain occupations. However, there are some fallacies in the use of mortality ratios, so some studies were made of actual death rates from tuberculosis in various dusty trades.

A study of the granite-cutters of Vermont showed that the high death-rate from pulmonary tuberculosis was primarily because of the dust hazard resulting from excessive use of pneumatic tools. Other studies showed similar results. A peculiar fact is that the dust in question in each case was made up partly, if not entirely, of silicon or crystalline rock. Lime-dust, on the other hand, seems to have no particularly harmful effect. Coal-dust, while favorable to respiratory disease, seems to exert a protective influence against active tuberculosis.

Describes laboratory studies on the influence of particular dusts in relation to tuberculosis and discusses the pathology of dust inhalation. Injurious effects of inhalation of a particular harmful dust are proportional to the amount of dust breathed, this resolving itself into the important consideration of the duration of trade life and the quantity of dust suspended in the atmosphere.

Economy and Safety in Transport. G. H. MILES. Journal of the National Institute of Industrial Psychology, London, January, 1925, Vol. 2, No. 5, pp. 192-197.

Discusses frequency and cost of accidents occurring on the streets and roads of Great Britain and shows that the failure of the human factor at a critical moment is largely responsible.

It is now recognized that physical, and more particularly mental, fitness is essential for all who control rapidly moving vehicles. Consequently many tests have been devised and put into use especially by larger transport companies. This is true in several European countries besides England and the benefits have shown that what was looked upon as a scientific fad is now considered a sound business proposition.

The tests used in Paris are described and their success indicated in that their use reduces the annual cost of training by about 130,000 francs. When developing the tests estimates were made of the abilities of 136 new employees and these showed an agreement, in over 84 per cent of the cases, with actual results later on. Three most important requirements are, (1) that the driver of a vehicle attend rapidly to the movements of numerous vehicles, (2) heed sounds coming from different quarters, (3) react effectively and rapidly to such stimuli.

Tests are outlined which measure such abilities. The principal one is a complicated reaction-time test in which the candidate is subjected to many and confusing stimuli. Motor suggestibility, muscular force, fatigability, and ability to estimate speed are also measured. Tests have also been devised to ascertain a candidate's behavior under abnormal conditions, but reproducing accident conditions in a laboratory is very difficult.

The New Principle of Adjusting the Industrial Worker's Wage to the Size of his Family. WILLIAM MCDOUGALL. Economic World, January 10, 1925, Vol. 29, No. 2, pp. 43–45.

Discusses a revolution going on in Europe of which little has been heard in America. A new plan of remuneration operating in France, Germany, Belgium, and other countries takes account of the family responsibilities and needs of the worker.

Described in some detail in a book entitled, "The Disinherited Family," by Eleanor Rathbone, published by Arnold & Co., London, England. Discusses the pros and cons, the motives, and the social and psychological probabilities.

The principal grounds on which advocates of the system take their stand are:

1. Apportionment of pay with regard to the number of children dependent on the worker is demanded by the principles of abstract justice. Rearing of children is a service to the nation and should be paid for.

2. Present system is inexpedient, wasteful and detrimental to the best interests of the nation. All attempts to establish the "fair living wage" have failed. The assumption that the number of dependents is a wife and three children does not hold in England or most other civilized countries. If children are to have a fair chance at healthy development the distribution of national income must be in relation to the family responsibilities of the workers.

3. From the eugenists' standpoint this system will increase the quality of the population. Evidence points to the conclusion that direct provision paid to the mother would, in the poorer classes, raise their standard of life, and an orderly and self-respecting living is the best cure for indiscriminate breeding. In the case of classes already restricting their numbers of children, it seems almost certain that such a compensation plan would tend toward an increase, because the present restraining motives are largely economic.

In 1906 the author advocated this plan of remuneration, especially in the Government services, and by corporations whose primary purpose is national service rather than profits. It was hoped that this example would be followed by the other employers. One great difficulty was foreseen, that, in the competition for employment and advancement, the childless and unmarried would be preferred by profit-earning concerns. This has been overcome in France by the pooling of the cost of allowances among the employers joining in the agreement by the formation of a compensation fund for family allowances.

Two other reasons are given for the adoption of the plan. It tends to prevent state endowment of motherhood, and solves the problem of relative rates of pay for men and women who do the same work.

And Now, the Case for the Employee. RICHARD F. GRANT. Nation's Business April, 1925, Vol. 13, No. 4, pp. 44–48.

Turns attention to the fourth element in the business function—the employee—after having discussed capital, management and the public in previous articles. Shows how all difficulties revolve around two questions: compensation, and conditions of work. Gives the popular conception of the worker as down-trodden, unhappy, bent upon vengeance; but if the worker is "class-conscious" as a producer he is equally so as a consumer, and is rapidly becoming so as an investor.

Points out two fundamental facts vital to the worker:

1. The present standard of wages and living has been made possible through increased output per man in production.

2. Generally speaking, increase of wages depends upon further reducing the cost of production.

If Labor can see that it is to its interest to increase output per man then it will want to make only reasonable restrictions and not carry them to the point of restricting production.

Business men want still further to raise the standard of living for everyone in the United States and are not only thinking of possibilities but realizing them. The labor of an employee is lessened while the number of units he can make is increased, and he receives a higher wage. As a consumer he buys an improved article at a lessened price. The whole keyword is in

the application of intelligence to effort. An example in the automobile industry is cited to show the point. Another in the shoe industry is given.

States that a worker without work is a loss and in bad times as high as 20 per cent of our productive capacity may be idle. The loss affects not only the worker but those in every walk of life and every section of the country. Our economic interdependence has become as strong as our political union, and so the workers of America are predominantly the buyers of the products of American industry.

American business strives against fluctuations in production and employment. The remedy suggested for the depression of 1921, was more production, simply to find means of increasing employment. Employees as well as others should be interested in lowering the cost of production for all suffer from business depressions and all are consumers of American products. But lowering the cost of production does not necessarily mean lowering wages. Employers like to see large earnings on the part of workers as long as the cost point does not go up, for that means happier workers and consequently less turnover.

"Is it too much to hope that our leaders among employers, and our leaders in industry will some time come together in a national way and determine these two questions, and that their findings will become a part of the fundamental knowledge of every man, woman, and child in the country, and the basis for a new advance in general prosperity?"

United States Civil Service Commission, Annual Report, Fiscal Year ended June 30, 1924.

This report has several features of interest to those engaged in personnel work. It describes the extent of the Service, the need for coördination and joint study of personnel problems by all departments and independent establishments through the agency of the chief coördinator, Bureau of the Budget.

Gives statistics on the number of examinations and appointments, and tables of all classes of persons receiving salaries from the government. Emphasizes the necessity of personnel records, and gives recommendations for a system of statistical records that shall be adequate. Indicates progress in the physical examination of appointees to Government services and briefly reviews the results accomplished. Discusses needs of the Commission and stresses the importance of research work to determine qualifications for positions and devise appropriate examinations.

The report of the Chief Examiner deals with improvements in examinations, revisions, standardization, developing tests of adaptability, oral tests of various kinds, improvements in procedure, etc. Character investigations have been utilized to an increasing extent. The merit system in filling professional positions is proclaimed to be a success. Gives comments of several prominent individuals as to the effect on the service of appointments by this method.

The report of the Director of Research is replete with descriptions of tests that have been devised to improve the selective value of civil-service examinations.

The Content, Form, and Arrangement of the Printed Classification and Compensation Plans. FRED TELFORD. Public Personnel Studies, February, 1925, Vol. 3, No. 2, pp. 42–51.

Reviews the progress made in the development of classification and compensation plans by quoting from an early one of the Chicago Civil Service Commission and from a recent one in Philadelphia.

Gives reasons for the absence of class titles in the early ones and shows their fundamental importance at the present day. In the present Class Specifications the content and set-up is quite varied, but six points are common and predominant:

1. Title.
2. Definition.
3. Examples of Typical Tasks.
4. Qualifications.
5. Lines of Promotion.
6. The Compensation Schedule.

Numerous examples of class specifications taken from various classification and compensation plans are given in the appendix.

Standardized Tests in Bacteriology. OSCAR B. HUNTER AND F. A. MOSS. Public Personnel Studies, February, 1925, Vol. 3, No. 2, pp. 52–66.

Describes a series of standardized tests for bacteriologists for the use of examiners in medical schools, state medical boards, bacteriological laboratories both in industry and the public service, nurses' training schools, etc. The tests have been standardized in the technical sense of the term. They are entirely in terms of the subject matter of bacteriology. Two supplemental tests on vision, and on education and experience are included.

Gives duties, examples of typical tasks, minimum qualifications, and desirable additional qualifications. Discusses salaries to some extent.

Defines standardized tests as to quantity, quality, and time, and shows how the tests in bacteriology were standardized. Large groups of medical students were used and tentative norms calculated. These were based on 175 cases and the figures are published.

Factors governing the selection of the tests are:

1. Possibility of making a wide sampling of information and judgment.
2. Ease, exactness, and quickness of giving and rating the tests.
3. Possibility of standardization.
4. Additional sets of tests of equal difficulty.
5. Different types of tests.
6. Attitude of those taking the tests.

The tests are:

NATURE OF TESTS	TIME ALLOWED	WEIGHT
	min.	
Test 1—Organisms, methods, infection, and immunity..... (Section A consists of 50 questions in the so-called multiple choice form, each with four answers suggested from which to choose the one correct answer Section B consists of 50 questions in the true-false form. Each statement is to be read and the competitor is to indicate by encircling the T or F whether it is true or false.)	60	7
Test 2—Recognition and diagnosis of bacterial micro-organisms..... (In section one are the names of 15 micro-organisms, 10 of which are described in section two. The competitor writes the name of the organism listed in section one which most nearly fits the description given in section two.)		
Test 3—Laboratory procedure..... (Four procedures, each of which can be accomplished in five steps, are given. The five steps are listed, but not in the order in which they would actually be done; in addition, several useless steps are included. The competitor for each procedure numbers from one to five the steps that he would use to carry out the procedure in the order in which he would use them.)	60	7
Test 4—Identification of micro-organisms from lantern slides..... (10 lantern slides of pathogenic bacteria showing typical colonies, various cultural characteristics, cell groupings, and the typical morphology of the organisms are shown. From the slide the competitor identifies the organism.)	10	1
Test 5—Eye sight..... (The individual is given one of the standard tests of eyesight used by opticians.)	*	
Test 6—Education and experience..... (A statement of the competitor's previous record, to be used only by personnel administrators.)	10	2

* No rating.

Each one is described in detail and given complete in the appendix.

The Reliability Coefficient of Personal Ratings. EUGENE SHEN. Journal of Educational Psychology, April, 1925, Vol. 16. No. 4, pp. 232–236.

The reliability of mental tests is usually measured by a correlation between results of two comparable tests. By analogy, the reliability of personal ratings may be evaluated by a correlation between ratings by two comparable judges. By pairing elements of two tests so that they are similar in difficulty and type, an author can to

a certain extent insure the comparability between his tests. But the comparability of judges is much more precarious; it is entirely beyond the control of the investigator except by a meager selective function that he may fallibly exercise. On account of this uncontrollable variability of judges, a correlation between two judges is a very crude approximation to the reliability of either. The reliability of a judge thus crudely evaluated often varies considerably according to the judge with whom he happens to be correlated.

This article describes a mathematical method for deriving a formula to eliminate the systematic error that occurs when two such series of ratings are correlated.

The Harmon Plan of Student Loans. E. HAYDEN HULL. Vocational Guidance Magazine, April, 1925, Vol. 3, No. 7, pp. 234.

Describes the features of operation of the Harmon plan:

1. Money is advanced to the student at 6 per cent on his own reputation of good character.

2. Interest begins to accrue at once and repayment of principal starts one year after graduation, at the fixed rate of $10.00 a month.

3. Delinquent accounts are strictly followed up.

4. Students insure each other through the Group Premium Plan. Each student signs for 10 per cent more than his cash loan, and when the last man in his particular group has paid in full, the extra 10 per cent is returned with interest. If there is a default it is deducted from the premiums of the others.

This last feature is the one which should make Student Loan paper negotiable at the bank, as it is a good business investment. When the five year experiment of the Harmon Foundation is completed, it is expected to show that under this plan any college should be able to discount approved student paper as a 6 per cent business proposition, and that any student of good character can obtain the money necessary to complete his education.

The College Curriculum and Vocational Guidance. BEN D. WOOD. School and Society, April 25, 1925, Vol. 21, No. 539, pp. 508–512.

Emphasizes once again the tremendous need for professional and vocational guidance by stating that about 35 per cent of those annually admitted to college fail to achieve the desired goal. Discusses what the college curriculum can do for educational and professional guidance. There is sufficient promise in its guidance potentialities to make it worth serious study.

Briefly reviews a study of college and professional grades made at Harvard and another made at Columbia to determine any relationship between collegiate subject matter and success in the professional school that may afford a basis for professional guidance. While these studies indicated no particular value in the college curriculum as an instrument of vocational guidance, the author does not think that such is necessarily the case. Consequently, later in the Columbia study, the relationships which obtained between success or failure in specific collegiate subjects and success or failure in particular professions were determined. The correlations ranged from 0.18 to 0.56 and suggest some significant relationships. The inference was made that not only must general excellence be emphasized, but also excellence in specific collegiate subject matter. These figures are cited as one bit of evidence which justifies the revival of interest in the specific achievements of students for vocational guidance purposes.

In spite of the success of intelligence tests and specific aptitude tests there is a definite turning to the subject matters of the curriculum for vocational guidance data. This is a logical development of the testing technique. Use of intelligence tests indicate the necessity for better measuring of higher educational achievement, and studies to determine such methods have been going on at Columbia for the past three years. Reliability of college grades has been raised from an average of about 0.6 to an average of about 0.85.

Revival of interest in achievements of students is a manifestation of the desire

of administrators to get as complete a picture as possible of the individual student. Long hoped for panaceas to cure misfits have given way to recognition of the fact that the best that can be done is to secure all possible information about the student.

Compares predictive value of college entrance examination records and secondary school grades, and shows the need for more knowledge of the student's high school experience. Recent studies with new methods for the measurement of specific achievement show that it is now possible to secure objective, reliable, significant, and comparable measures of specific achievement throughout the whole educational ladder; and it is only natural that there should be a strong demand for the realization of these much-hoped-for possibilities.

Attempts to answer the question, "Why is our college guidance so ineffective and what is the remedy?" Guidance is bad because, (1) it comes too late, (2) is never complete, (3) usually very inaccurate, (4) not stated in comparable units for any large body of students, (5) difficult to guess meaning of grades on a record card, (6) no adequate liaison system for transfer of personality or interests, (7) value of prognostic tests given at college entrance very unreliable. Tests become less and less reliable as we go up the chronological scale. Tests given in grammar and high schools are much more illuminating.

Urges greater coöperation between colleges and lower schools and demands cumulative records of achievement based on objective and reliable measures of known significance. When all lower schools are able to furnish adequate records, and colleges provide administrative facilities for using the information, then admission and guidance will be active selection rather than passive acceptance of what is offered. Then will the college fulfill its duty of searching out and educating all the creative minds in each generation.

Suggested Tests for Painter. F. A. Moss. Public Personnel Studies, April, 1925, Vol. 3, No. 4, pp. 131–136.

Discusses duties, qualifications, and factors governing selection of tests; and suggests the following tests for Painter:

NATURE OF SUGGESTED TESTS	SUGGESTED TIME	SUGGESTED WEIGHT
	min.	
Test 1—Work, materials, tools, and equipment	30	4
(Forty questions in the multiple choice form, each with four suggested answers from which the competitor chooses.)		
Test 2—Calculations	15	2
(Five typical problems involving calculations of the kind a Painter is often called upon to make.)		
Test 3—Understanding of written specifications	15	2
(Ten questions as to the meaning and interpretation of the written specifications for a painting job.)		
Test 4—Education and experience	10	2
Test 5—Physical condition	5	*

* No weight.

Each of these is discussed in detail and printed in full.

News Notes

REPORT OF VOCATIONAL SERVICE FOR JUNIORS, NEW YORK CITY

The Vocational Service for Juniors has made a demonstration experiment in vocational guidance and placement in various schools in Manhattan, and in its annual report bearing the date of November, 1924, proposes a program for vocational guidance in the Junior High Schools of New York City and placement of children between 14 and 17.

Some figures indicating the scope of the work from September, 1923, through June, 1924, are as follows: 2550 children were interviewed and 4654 re-interviews were given; 2283 children filled out questionnaires telling about their school plans, their interests and something of their family background; 4108 psychological tests were given; 4415 school records were copied; 2577 conferences were held with principals and teachers regarding individual children; 1115 parents were interviewed either in school or at their homes. In 382 cases, coöperation was secured from visiting teachers, school nurses, health clinics and relief agencies. 291 occupational talks were given to children in class room periods or after school.

The proposed program involves establishing some 42 counselors in the Junior High Schools, placement offices in the continuation schools, and an executive office with a director. The budget required would be well over $100,000 exclusive of the salary of the executive officer.

The report is receiving the consideration of the Board of Superintendents.

AMERICAN MANAGEMENT ASSOCIATION

Meeting of Sales Executive Division

The Sales Executive Division of the American Management Association met in Boston, April 7 and 8. The reports gave many details covering a wide variety of methods of distribution. The plan of the meeting which gave each speaker a definite outline to be covered in reporting the experiences of his company made the entire session extremely valuable for comparative purposes. Each speaker gave a resumé of the method of marketing products, the form of organization developed, and the methods of assigning territory to districts and to individual salesmen. Specific facts were presented on the selection, training and compensation of salesmen. The nature of different types of contracts and the general duties of salesmen with respect to collections, selection of prospects, and reports were discussed by each company representative reporting. Probably the outstanding weakness of the reports is exhibited in the discussion of quotas. The term has such a variety of meanings that little of value can be given in such reports until attention is concentrated on each meaning separately.

Sales managers in attendances found much of value in the variety of suggestions offered. Those not in attendance will find the report of the meetings worth perusing.

The development of the plan of separate sectional meetings for special groups of the American Management Association is well illustrated by the success of such conferences as these. Two conferences, one on financial problems of the financial executives and one on varieties of wage incentives were held in May.

MEDICAL SUPERVISION IN INDUSTRY

In protecting the health of workers, forward strides are being made by industrial establishments in the United States, as reflected in a survey of the cost of health service in industry now being carried forward by the National Industrial Conference Board. According to the investigation, as far as completed, on the average about 16 per cent more money per employee

is now being spent by industry on medical supervision than was being spent four years ago, when a similar survey was made.

Out of 446 establishments covered by the survey, 255 report that applicants for employment are being physically examined, and most of these plants use the result of the medical examination as a guide in selecting the proper work for the applicant. In many plants, employees as well as executives are re-examined at regular intervals. Much care is exercised to safeguard workers from contact with infectious diseases.

Objections to physical examination by employees and applicants for work are practically nil, the Board's investigation indicates.

Only 11 plants had discontinued the policy of medical examination out of the 446 included in the survey.

In 501 plants replying to the Board's questionnaire, the following personnel was engaged in looking after the physical welfare of the workers: 265 full time physicians; 356 part time physicians, 773 physicians on call; 13 full time dentists, 78 part time dentists; 152 male nurses, 693 female nurses, and 121 visiting nurses; the medical staff included 256 technical assistants and 361 clerical assistance.

The Board's investigation as far as completed, indicates increasing thoroughness of physical examinations of the workers. The general policy of the industries is to extend medical supervision into the fields of sanitation, safety, general welfare, home visitation, health education, and related matters.

NEW JOURNAL OF INDUSTRIAL SAFETY

The International Labour Office has begun the issue of a new international publication, the *Industrial Safety Survey*, as a bi-monthly of 28 pages or more. Individual copies are 30 cents, and the annual subscription rate, $1.50.

In a foreword the editors of this new publication state that "the aim of the *Industrial Safety Survey* is to serve as a medium for the direct exchange of ideas and experiences both between the different countries and between employers, workers, and factory inspectors. In order that it may be able to fulfill this task, it opens its columns to the discussion of all subjects which have any bearing on the problem of the prevention of accidents. It will publish articles on technical developments in the sphere of accident prevention, articles discussing accidents of special interest and the lessons to be learned from them, and statistical studies on the progress of accident prevention in the different countries or in separate industries or processes. . . . . It is also intended to record the efforts and activities in the field of accident prevention which are going on from day to day."

PERSONNEL SYSTEM FOR SHEFFIELD SCIENTIFIC SCHOOL

The Faculty of the Sheffield Scientific School at Yale have approved general recommendations for a personnel system to be inaugurated for the recognition and development of character and personality as well as scholarship. Administration of the system will be in the hands of a personnel organization composed of Dean, Registrar, and Division Officers of the Scientific School. The Student Council will be invited to coöperate in the administration of the new system.

It is expected that several advantages will be secured by recording for each student his extra-curricular activities and estimates or ratings of his personal qualities. The decision by the School of questions of discipline or of special privileges will be facilitated. The School will be able more easily to answer proper inquiries concerning students and will be aided in placing them in positions for which they are best qualified. The Faculty and the students will be reminded of the importance of character and personality in addition to scholarship; students who cannot attain high grades in their studies but who possess other important qualifications for success in life will be encouraged; and members of the Faculty will be influenced to value such students more nearly at their true worth. Finally, self-analysis on the part of the student will be stimulated, and an incentive and guide for self-improvement will be furnished.

According to the plan for compiling personal records each member of the Faculty

will be given an opportunity to rate the personal qualities of each student in his classes, but no one will be expected to rate any personal quality of a student unless he believes he can do so with justice to the student. Each Division Officer will be held responsible for obtaining the ratings of personal qualities and also records of extra-curricular activities for each of the students in a group assigned to him. As a general rule only twenty-five students will be assigned to each Division Officer. The personal records will be compiled near the end of the year, beginning with the Sophomore year of a student. The records will not be open for general inspection, but only to the Dean and such as he may designate. The ratings will not be used as a basis of judgment for any considerable period of time after a student's graduation.

COLLEGE PERSONNEL RESEARCH CONFERENCE

The conference on College Personnel Research held in Washington, May 22 and 23, under joint auspices of Personnel Research Federation; American Council on Education, National Research Council, and Advisory Council of the proposed Bureau of College Personnel Research, marked the progress being made in vocational, educational and personal guidance.

Representatives from forty-five different institutions participated under the chairmanship of Dean H. E. Hawkes, of Columbia College, Columbia University. Summaries of progress in personnel research and administration, exhibits of research material, bibliographies, occupational information literature and record forms were presented.

The following proposals submitted by conference committees indicate the trend of research. Investigators planning research on these or other topics in this field are asked to communicate with P. S. Achilles of the Personnel Research Federation, 40 West Fortieth Street, New York City, where a clearing house of information is maintained.

Projects relating to administration of personnel service

Study of budgets for vocational guidance service and possible sources of income.

Studies of organization of college vocational guidance service.

Placement—comprehensive survey and analysis of the vocational field planned from student's viewpoint.

Relative difficulty of various courses, departments, and curricula, taking into account the intelligence of students.

Results of sectioning classes, and of controlled pedagogical experimentation of collegiate level.

Standardization of cumulative personal record forms and terminology.

Effectiveness of different methods of giving students vocational information experimentally controlled.

Projects relating to vocational counseling

Collection of vocational guidance information. Objective descriptions of occupations leading to and based upon a common terminology.

Interviews. Definition of functions, analysis and evaluation of various elements in technique.

Criteria of success. (a) What constitutes success or progress? (b) Results of experimentally controlled educational and vocational guidance, including follow-up of careers of students advised. (c) Long time follow-up studies of children through school and subsequent educational and vocational careers.

Annotated Bibliographies. Selection of titles for: (a) Students; (b) Teachers; (c) Counselors; (d) Research workers.

Projects relating to examination methods

Coöperative study of intelligence tests for college freshmen.

Development of objective measures whereever possible to replace or supplement subjective judgments.

Projects relating to personality traits

Experimental studies of physiological factors underlying personality traits.

Search for unique traits and their reduction to practical working scales.

Incentives of college students. What are the laws of the growth and decay of motives and the appeal of incentives?

Review of mental hygiene literature to separate possible scientific hypotheses from propaganda that characterizes much of the mental hygiene movement.

Improvement of rating scales.